THE EFFECTS OF SELF-MONITORING OF STUDYING BEHAVIOR ON THE SPELLING PERFORMANCE OF LEARNING DISABLED STUDENTS

By

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A DISSERTATION PRESENTED TO THE GRADUATE COUNCIL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

1980

ACKNOWLEDGMENTS

I am very proud to have completed the doctoral program in special education at the University of Florida. Our department is staffed with dedicated and extremely competent faculty members. Also, our secretarial staff is headed by an extremely competent individual, Leila Cantara, who has certainly earned a doctoral degree several times over. Without the guidance and support of these individuals I would not be where I am today.

I also would not have survived my doctoral years without the support of my mother, father, and brothers Mike, Gene, Joe, and Jim. Their love has provided a constant source of inner strength.

The love and support of special friends Bob and Karen Algozzine and Melanie and Bill Reid have also contributed much to my personal and professional growth. The love and openness of the Algozzine and Reid homes and beauty and uniqueness of Karen, Bob, Gary, Kathy, Mike, Bill, and Melanie have been a source of much insight and inspiration.

I would not have been able to complete my doctoral studies without the support and assistance of my chairperson and advisor

Rex Schmid. Rex has seen me through various stages of personal and professional growth. For his understanding, patience, time, and guidance I am greatly appreciative.

My supervisory committee is made up of very special individuals, Bob Algozzine, Leonard LaPointe, Bob Jester, and Stuart Schwartz, who gave generously of their time and professional knowledge. Each member added a uniqueness to the committee which enhanced group interaction and made the committee very special to me.

Bill Wolking also gave generously of his time and academic expertise. This research could not have been carried out without his help and cooperation.

Finally, I would like to thank Dr. Warren Rice, Dr. Bill Reid, and Dr. Myron Cunningham for critically reviewing this document, Dr. Bill Cutler and Karen Schroll for guidance in making the experimental tapes, Dr. Wenzel for sharing her knowledge of spelling instruction, and Mary Beth Volk, Jean Shelton, Mary-Helen Keen, Tom Bergbower, and Kathy Nash for their cooperation throughout the data collection phase of this study.

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Abstract of Dissertation Presented to the Graduate
Council of the University of Florida in Partial
Fulfillment of the Requirements for the
Degree of Doctor of Philosophy

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August, 1980

Chairman: Rex E. Schmid
Major Department: Special Education

A frequently mentioned goal of our educational system is to teach students to become self-directing. Techniques designed to develop self-control have been used to modify a variety of problematic behaviors. In educational settings self-control procedures have effectively modified academic and academically related behaviors. Research concerning the effect of self-control procedures on academic behaviors has focused on the ability to perform various tasks at a high correct rate. Research on the effectiveness of self-monitoring when a student is first learning to perform a behavior and the effect of self-monitoring on retention of academic material is lacking. The present study was designed to determine the effect of self-monitoring (i.e., self-assessment and self-recording) on the acquisition and retention of spelling letters and words by learning disabled (LD) students.

Four students participating in a summer school program for LD students served as subjects for the experiment. In the first and third phases of the investigation, subjects were given 15 spelling words to study for a 10-minute period. A tape recording provided the student with information on when to start and stop studying the spelling words. During the second and fourth phases, the tape also provided beeps at random intervals from 18 to 88 seconds apart. The student was instructed to make a check on a self-monitoring card if he was studying the spelling words when the beep sounded.

Data on the percent of spelling letters and words acquired during each experimental session and data on the percent of words retained were collected. The mean and standard deviation for percent of letters and words acquired and retained by each subject during each phase of the study were calculated.

Self-monitoring, as implemented in the present study, produced differential effects for the four subjects. Based on these equivocal results it is recommended that further research into the effectiveness of self-monitoring be conducted.

CHAPTER I

INTRODUCTION

A frequently mentioned goal of our educational system is to teach students to become self-directing (Dewey, 1939; Gagne, 1965; Lovitt & Curtiss, 1969; McLaughlin, 1976; Winett, 1973). Numerous authors have suggested that the development of independently functioning individuals might be enhanced through techniques designed to develop self-control (Fagan, Long, & Stevens, 1975; Felixbrod & O'Leary, 1973; Lovitt, 1973; Mahoney & Thoresen, 1974; McLaughlin, 1976; Polsgrove & Mosley, 1976; Thoresen & Mahoney, 1974; Winett & Winkler, 1972). Self-control procedures have been used to modify a variety of behaviors in educational settings: talk outs (Lovitt, 1973); hitting behavior (Lovitt, 1973); disruptive behavior (Bolstad & Johnson, 1972; Drabman, Spitalnik, & O'Leary, 1973; Kaufman & O'Leary, 1972; Santogrossi, O'Leary, Romanczyk, & Kaufman, 1973); on-task behavior (Broden, Hall, & Mitts, 1971; Glynn & Thomas, 1974; Glynn, Thomas, & Shee, 1973; Shapiro & Klein, 1978); test performance (Glynn, 1970); academic response rate (Lovitt & Curtiss, 1969); and academic productivity (Felixbrod & O'Leary, 1973, 1974; Hallahan, Lloyd, Kosiewicz, Kauffman, & Graves, 1979; Lovitt, 1973; Neukater, 1978).

Most of the self-control studies examine at least one of the components of self-control suggested by Bandura and Perloff (1967). The proposed components include:

1. Self-assessment--the individual may examine his/her own behavior and decide whether or not he/she has performed a specific behavior or class of behaviors.
2. Self-recording--the individual may objectively record the frequency of his/her own performance of a given behavior or class of behaviors.
3. Self-determination of reinforcement--the individual may determine from all available reinforcers the nature and amount of reinforcement he/she should receive contingent upon his/her performance of a given behavior or class of behaviors.
4. Self-administration of reinforcement--the individual dispenses his/her own reinforcers (which may or may not be self-determined) contingent upon his/her performance of a given behavior or class of behaviors. (p. 105)

In general, literature concerning the use of self-control procedures indicates that self-control is as effective as externally imposed programs in modifying classroom behaviors. Several researchers have used self-control procedures to maintain behavior change established through external-control procedures (Bolstad & Johnson, 1972; Drabman et al., 1973; Glynn et al., 1973; Kaufman & O'Leary, 1972; Lovitt & Curtiss, 1969; Neukater, 1978; Shapiro & Klein, 1978). Other investigators have found that self-control procedures can be used to effect behavioral change without an initial systematic external-control phase (Broden et al., 1971; Felixbrod & O'Leary, 1973, 1974; Glynn, 1970; Glynn & Thomas, 1974; Hallahan et al., 1979; Lovitt, 1973). The results of three investigations which compared the effectiveness of self-and external-control procedures (Felixbrod & O'Leary, 1973, 1974; Glynn, 1970) suggest that the procedures are equally effective in producing behavioral change.

Several advantages of self-control over external methods of behavior control have been noted in the literature. For example, Lovitt (1973) found that self-management often results in increased motivation. The benefit of increased teacher time is frequently cited as an advantage of self-control procedures over external methods of behavioral control (Bolstad & Johnson, 1972; Hundert & Batstone, 1978; Karoly, 1977; Polsgrove & Mosley, 1976; Santogrossi et al., 1973).

Research concerning the effects of self-control procedures has been conducted with a variety of populations. The use of self-control techniques with learning disabled (LD) students has been neglected until recent investigations by Neukater (1978) and Hallahan et al. (1979). Hallahan et al. (1979) investigated another previously neglected area of research, i.e., the effect of self-monitoring not only on on-task behavior but on academic productivity. Hallahan and colleagues, as well as most of the researchers investigating the effect of self-control on an academic behavior, looked at the student's ability to perform academic tasks at a high correct rate, i.e., the fluency building phase of learning (Haring, Lovitt, Eaton, & Hansen, 1978). Research concerning the effect of self-control procedures when a student is first learning to perform a behavior, i.e., the acquisition phase of learning (Haring et al., 1978), and the effect of self-monitoring on the retention of academic material is lacking.

Justification of the Study

The use of behavior modification in the public schools has typically involved the teacher as the behavior change agent. The use of teachers as behavior modifiers is not always practical. For example, it is not always possible for the teacher to attend closely to the behaviors of the student if he/she is in another part of the room (Surratt, Ulrich, & Hawkins, 1969). Further, it may be difficult for the teacher to effectively manage the behavior change programs of a number of students simultaneously. Surratt et al. (1969) suggest that problems with the use of teachers as behavior modifiers result in the neglect of many children with mild behavior problems. These authors suggest that when teachers are relied upon to manage behavior change programs, professional attention is provided only after a severe behavior problem is well established. Since an increasing number of exceptional students are being maintained in and mainstreamed back into regular classes, alternative methods of behavioral control need to be investigated.

Statement of the Problem

Investigations concerning the use of self-control with LD students are limited. Further, research concerning the effect of self-control procedures on the acquisition and retention of academic material with exceptional students has not been conducted. The present study was designed to investigate the effect of self-monitoring of studying behavior on the acquisition and retention of spelling letters and words by LD students.

Purpose

The purpose of this study was to investigate the effect of self-monitoring of studying behavior as a technique for improving the spelling performance of LD students.

Variables

The independent variable in this study is the presence or absence of self-monitoring of studying behavior. The dependent variables are percent of spelling letters acquired, percent of spelling words acquired, percent of spelling letters retained, and percent of spelling words retained.

Questions Under Investigation

This study is designed to answer the following questions regarding the influence of self-monitoring of studying behavior on spelling performance.

1. What is the effect of self-monitoring of studying behavior on the percent of spelling words acquired by LD students?
2. What is the effect of self-monitoring of studying behavior on the percent of spelling words retained by LD students?
3. What is the effect of self-monitoring of studying behavior on the percent of spelling letters acquired by LD students?
4. What is the effect of self-monitoring of studying behavior on the percent of spelling letters retained by LD students?

Definition of Terms

Learning Disabled--those students meeting Alachua County criteria for placement in a program for LD youth.

Self-monitoring--given the opportunity to evaluate his/her own behavior the student makes a mark indicating that a specified behavior has or has not occurred.

Spelling-- "to name, write, print, or signal the letters which make up a word, especially the right letters in the right order" (Webster, 1973, p. 1744).

Studying Behavior--"The act or process of applying the mind in order to acquire knowledge" (Webster, 1973, p. 1808). Since studying is a covert act and cannot be measured directly, overt behaviors indicative of the method of independent study will be observed. For example, does the student look at the card, look away, and write the word.

Delimitations

The population of LD subjects was made up of students recommended for the LD Summer School by LD teachers in Alachua County, Florida. Thus, this population may evidence more serious learning problems than a normal LD population.

The study was conducted in a summer school setting which students attended for three hours each morning. This setting differs from a regular public school LD program in that the period of time is in addition to the regular school year and the hours of operation are shorter than those of a regular school program.

Limitations

1. The vagueness of the LD definition may lessen the generalizability of the results of the study to other students labeled LD.

2. The limited geographical area from which subjects were selected may limit the generalizability of the results.

CHAPTER II

REVIEW OF THE LITERATURE

Educators have become increasingly concerned about the independent functioning of students. Numerous authors have suggested (Fagan, Long, & Stevens, 1975; Felixbrod & O'Leary, 1973; Lovitt, 1973; Mahoney & Thoresen, 1974; McLaughlin, 1976; Polsgrove & Mosley, 1976; Thoresen & Mahoney, 1974; Winett & Winkler, 1972) that the development of self-directing individuals might be enhanced through techniques designed to develop self-control.

This literature review begins with a general discussion of self-control followed by an analysis of studies reporting the effects of self-control of behaviors on classroom functioning. To be included in this review a study had to meet eight criteria.

1. The treatment conditions and experimental procedures must have been detailed enough to permit replication.

2. Experimental conditions must have been replicated, i.e., AB experimental designs were considered inadequate.

3. Groups that were compared must have been exposed to the same treatment conditions.

4. The number of experimental sessions must have been greater than four.

5. The difference in response rate for two conditions must have been at least two responses per minute.

6. The design of the study must have been appropriate based on the guidelines presented by Campbell and Stanley (1963) and Hersen and Barlow (1976).

7. Data analysis procedures must have been described and appropriate based on the guidelines of Kerlinger (1973) and Hersen and Barlow (1976).

8. Data used to derive conclusions must have been provided in the report or available upon request.

Several studies, while not meeting the criteria above, provided information which was considered relevant and useful to those interested in the self-control literature. For this reason, some studies not meeting all the adequacy criteria were reviewed and reported. In these cases a cautionary note for the reader was also included.

Behaviorists have historically focused on overt behaviors and their environmental determinants in explaining and treating problem behaviors. The effect of private events, e.g., thoughts, was minimized. Research confirming the importance of cognitive events on behavior has resulted in growing dissatisfaction with stimulus-response explanations of behavior, and sparked interest in the manipulation of internal or covert events as a method of behavior change (Kazdin, 1978).

Although there has been some resistance in endorsing behavior change techniques based upon cognitive theory, investigations involving manipulation of cognitive events can be found in the behavior modification literature (Kazdin, 1978). For example, Wolpe (1958) would shout "Stop!" to interrupt clients ruminations. Eventually the client was to repeat "Stop!" to him/herself to control thoughts of rumination. Goldiamond (1965) also manipulated a covert event by instructing a student to leave her desk if she started daydreaming when studying.

The case for effective treatment of covert events through operant principles was first made by Lloyd Homme (1965) in his article entitled, "Control of Coverants: The Operants of the Mind." Homme proposed that covert events, i.e., thoughts, images, reflections, fantasies, might be detected and reinforced by the individual who experiences them. Homme's article stimulated research concerning the use of cognitive behavior modification and self-control techniques to effect behavior change (Kazdin, 1978).

Research concerning the effectiveness of self-control procedures has included such behaviors as cigarette smoking, food and caloric intake, alcohol consumption, face touching, use of habit phrases, contributions to classroom discussions, hallucinations, eye blinking, use of personal pronouns, various study behaviors, participation in pleasurable activities, feelings of depression, tics, dating behaviors, sexual activities, use of drugs, time spent by phobic patients in fearful situations, mother's responses to positive and negative child behaviors, nail biting, swimming, room cleaning, use of praise, speech dysfluencies, respiration, sleep patterns, hand gestures, and successfully resisted urges to engage in desirable acts (McFall, 1977). These self-control programs typically involved a contract or agreement between the therapist and client to work toward a specified goal. The client would then self-monitor the behavior to be changed. The particular self-monitoring methods employed in various studies were summarized by McFall (1977, p. 197-198).

> The particular method by which subjects monitor particular behaviors may vary along a number of general dimensions. It can range from a very informal and unstructured operation, as when subjects are asked to make mental notes of any event than seems related to mood changes, to something fairly formal and structured, as when subjects are asked to fill out a mood-rating sheet according to a time-sampling schedule. It can be fairly simple, as when subjects are asked to keep track of how many cigarettes they smoke in a given time period; or it can be complex and time-consuming, as when they are asked to record not only how many cigarettes they smoke, but also the time, place, circumstances, and affective response associated with lighting each cigarette. It can be a relatively objective matter, as when counting the calories consumed each day; or it can be a very subjective matter, as when recording the number of instances each day when they successfully resist the temptation to eat sweets. A single, discrete target behavior might be monitored, like the number of textbook pages read per day; or several target behaviors might be monitored concurrently, like the number of pages read, classes attended, assignments completed, hours spent in the library, contributions made to class discussions, and grades received--all seen as related elements in the general category of effective study behavior. The timing of the SM [self-monitoring] act also can vary. For example, it is possible for subjects to record caloric intake immediately prior to eating, immediately after, or retrospectively at bedtime.

McFall (1977) also summarized the advantages of self-monitoring over other behavior change techniques.

1. Self-monitoring is less costly than other data collection procedures, e.g., employing trained, paid observers.

2. Self-monitoring is often the only feasible method of obtaining naturalistic data on certain classes of sensitive, private, or inaccessible behaviors such as sexual thoughts and activities.

3. Self-monitoring provides a means of minimizing the possibility of unwanted effects occurring as a result of the obtrusive presence of observers.

4. Self-monitoring can yield a behavioral record characterized by a thoroughness and density coverage that few methods can equal.

Various methods have been used in self-management behavior change programs. For example, clients have been instructed to set up environmental conditions which range from physical prevention of the undesirable behavior, e.g., locking him/herself in a room, to self-instructional responses, e.g., repeating statements about the positive aspects of tolerating an unpleasant situation. Self-presented imagery has also been used to effect behavior change. The self-management of behaviors, particularly in educational settings, frequently involves the use of the self-control components delineated by Bandura and Perloff (1967), i.e., self-assessment, self-recording, self-determination of reinforcement, and self-administration of reinforcement.

Some of the studies that investigated the effect of self-control procedures on academic and academically related behaviors involved a variety of the self-control components (see Table 1). The effect of self-reinforcement and self-monitoring specifically was investigated in other studies.

Self-Control

One of the first studies that evaluted the effect of a combination of the self-control components was conducted by Bolstad and Johnson (1972). These authors compared the effect of all four self-control components to external control after an initial period of systematic external control. The results indicated that there was

Table 1

Summary of Reviewed Studies

Authors	Subjects	Treatment	Measures	Results	Problems
Lovitt & Curtiss (1969)	12-year-old behaviorally disordered student	evaluated effect of self-det of reinf after exposure to external-det of reinf	rate of math problems correctly solved	higher rate of correct problem solution when student det reinf contingencies	median difference in resp rate in two conditions sml
Glynn (1970)	four classes of ninth-grade girls	compared effect of self-det of reinf to ext-det of reinf	average number of history and geogr. test items answered correctly	no stat sig diff in number of test ques ans corr by self- & ext-det groups ($p < .05$)	mean performance scores for the groups unequal in the initial baseline phase sml treatment effects in final phases of study
Broden, Hall, & Mitts (1971)	two eighth-grade regular-class students	compared effect of self-monitoring to absence of self-monitoring	percent of time on-task	on-task beh incr in self-mon condition	student requested program to impr school perf thus highly motivated
			freq of talk-outs per min	talk-outs decr in self-mon condition	median diffs in freq of talk-outs in two conds sml

Table 1 - Continued

Authors	Subjects	Treatment	Measures	Results	Problems
Bolstad & Johnson (1972)	38 students with high rates of disruptive beh	compared effect of all four self-contr components to ext contr after initial exposure to both groups to ext contr	freq of disruptive behs (i.e., talking out, aggr, & out-of-seat) per minute	no stat sig diff freq of disrup behaviors of self- & external-control groups ($p < .01$)	magnitude of reinf not same for two conds contr gr also decr in disrupt behavs
Kaufman & O'Leary (1972)	16 students in a psychiatric hosptial sch with reading probs & high rates of disruptive beh	evaluated effect of self-assess & det of reinf after exposure to ext control	average daily level of disr beh for class number of reading sections completed	general low level of disrupt behav maint during self-control phase of study overall incr in number of reading selections completed	reinf of beh in self-contr cond essentially non-contingent since student received reinf based on self-asses regardless of accuracy
Drabman, Spitalnik, & O'Leary (1973)	eight boys in an adjustment class for acad & emot probs 9-10 years of age	evaluated effect of self-assess & det of reinf after exposure to ext control	mean number of disrupt behs daily progress in reader reading-vocab pre & posttest	social & acad behs were maint during self-control condition	low rates of disrupt beh generalized to the control period neither baseline nor var fading procedures were replicated

Table 1 - Continued

Authors	Subjects	Treatment	Measures	Results	Problems
Drabman et al. (1973) Continued					teacher cont'd to praise accurate assess & reprimand over eval in self-contr cond thus confounding results
Felixbrod & O'Leary (1973)	24 second-grade students	compared self-det of reinf to ext det	mean number of corr solutions in arithmetic amount of time spent in task setting rate of corr prob solving percent of math probs solved corr	no stat sig diff in corr prob solution or time on-task of self-contr & ext-contr groups ($p < .05$)	
Glynn, Thomas, & Shee (1973)	eight second-grade students	evaluated effect of all four self-contr components after exposure to ext-control	percent of 10-second intervals student on-task	self-control procedures maintained high rate of on-task behavior established during ext-contr cond	
Lovitt (1973)	regular fourth-grade nine-year-old girl	compared self-mon to ext mon	freq of talk-outs	talk-outs decr in self-mon condition	used AB exp des median diff in resp rate in two conds sml

Table 1 - Continued

Authors	Subjects	Treatment	Measures	Results	Problems
Lovitt (1973) Continued					teacher reminded st to rec talk-outs in self-mon phase thus confounding results
	second-grade boy	compared self-mon to absence of self-mon	rate of hitting beh	rate of hits decr in self-rec cond (it should be noted that hits were elim completely when the subj ripped up his self-mon card & refused to self-rec any longer)	used AB exp des
Santogrossi, O'Leary, Romanczyk, & Kaufman (1973)	nine adoles boys in a psychiatric hospital schl	compared self-asses (tied to amt of reinf received) to ext control	mean freq of disrupt behs per interval	self-assess was not effective in reducing rate of disr beh or in maintaining low rates estab by ext contr	reinf of beh in self-contr cond essentially noncontingent since student received reinf based on self-asses regardless of accuracy--authors reported that students tended to overrate their perf to beat the system vagueness of rules on which reinf system based, i.e., work hard, work continuously

Table 1 - Continued

Authors	Subjects	Treatment	Measures	Results	Problems
Santogrossi et al. (1973) Continued					students used social pressure to provoke others into defiance of program
Felixbrod & O'Leary (1974)	24 eight to nine-year-old second & third-grade students	self-det of reinf compared to ext control	mean number of corr solutions in math amt of time spent in task setting	no stat sig diff in corr prob solution or time on-task of self-contr & ext contr groups ($p < .01$)	
Glynn & Thomas (1974)	nine third-grade students	compared effect of all four self-contr components to abs of self-control	mean percent of intervals of on-task behavior	increased level of on-task behavior in eight of nine students	no opportunity for reinf in abs of self-contr cond thus conditions not matched new procedure introduced in phase four thus phase two not replicated exactly

Table 1 - Continued

Authors	Subjects	Treatment	Measures	Results	Problems
Neukater (1978)	six LD students in psychiatric hospital sch mean age 10 years	compared effect of self-det of reinf to ext contr after initial exposure to ext contr	mean number of math assignments completed percent of corr & incorr solutions percent of on-task & disrupt beh	self-control cond resulted in sig impr in math perf, & on-task beh, & decr in disrupt beh (p < .10)	descr of conditions not complete enough to analyze study criteria to earn reinf diff in two conds question res since initiation of token economy after cond of no-reinf res in decr in mean number of tasks comp & incr in errors--res based on comparison of this token phase w/ self-contr phase changes in perf also noted in control period statistical procedures inappropriate

Table 1 - Continued

Authors	Subjects	Treatment	Measures	Results	Problems
Shapiro & Klein (1978)	four MR/ED students in a psychiatric hospital sch six to nine years of age	evaluated effect of self-assess & admin of reinf after exposure to ext-assess & del of reinf	percentage of task cards attempted used to meas task performance percentage of intervals of on-task & disrupt behaviors	task accuracy remained at a high level during self-contr phases while task perf cont to incr high level of on-task & low level of disrupt beh maint	no reversal of self-contr cond or various fading steps
Hallahan, Lloyd, Kosiewicz, Kauffman, & Graves (1979)	seven-year-old LD boy with attention problems	compared self-mon to absence of self-monitoring	percent of intervals on-task rate of corr resp in handwriting & math	on-task beh & acad resp rate increased in self-mon cond	

no statistically significant difference in the frequency of disruptive behavior of the self- and external-control groups. The results do suggest, however, that students with high rates of disruptive behavior could effectively use self-control procedures to maintain low rates of disruptive behavior established in an external-control condition. The results should be viewed with caution since the magnitude of reinforcement was higher in the self-control condition. Further, the control group also showed a decrease in disruptive behavior. As the authors pointed out, however, the control group may have had less opportunity to engage in disruptive behavior when the self-control group decreased in disruptive acts.

A study conducted by Kaufman and O'Leary (1972) evaluated the effect of self-assessment and determination of reinforcement on the disruptive behavior of 16 students in a psychiatric hospital school who exhibited reading problems and high rates of disruptive behavior. The results supported those of the Bolstad and Johnson (1972) investigation, i.e., the low level of disruptive behavior established during the external-control phase was maintained in the self-control condition. Further support for the Bolstad and Johnson (1972) and Kaufman and O'Leary (1972) results was provided in an investigation conducted by Drabman et al. (1973). Drabman and colleagues investigated the effect of self-assessment and determination of reinforcement after initial exposure to external control. The subjects were eight boys, 9 to 10 years of age, who were placed in a class for academic and emotional problems. The results indicated that self-control procedures effectively maintained academic and social behaviors established in the external-control condition. Since neither the baseline phase nor various fading procedures were replicated, the results should be interpreted with caution. Thus the results of the Bolstad and Johnson (1972), Kaufman and O'Leary (1972), and Drabman et al. (1973) studies suggest that self-control techniques can be used by students with high rates of disruptive behavior to maintain low rates of disruptive behavior established through external-control procedures.

Conflicting results were obtained in another study (Santogrossi et al., 1973) in which self-assessment (tied to the amount of reinforcement received) was compared to external control. The results indicated that self-assessment was not effective in reducing the rate of disruptive behavior of nine adolescent boys in a psychiatric hospital school who exhibited high rates of disruptive behavior. Further, the self-assessment procedures were not effective in maintaining low rates of disruptive behavior established in an external-control phase. A possible confounding factor in the study could have been the essentially non-contingent nature of the reinforcement in the self-control condition. In the self-assessment phase the student received reinforcement based on his self-assessment regardless of the accuracy of the assessment. The authors reported that students tended to overrate their performance to beat the system and used social pressure to provoke other students into defiance of the program. However, overrating was not reported as a problem in a previous study (Kaufman & O'Leary, 1972) in which reinforcement in the self-control condition also was potentially non-contingent. Conflicting results may have been due to differences in exposure to the external-control condition. The length of exposure to the external-control condition was only nine days in the Santogrossi et al. (1973) study, compared to 15 days of external control in the Kaufman and O'Leary study. Further research is needed to determine if length of exposure to external control is a contributing factor to the success of self-control programs with certain populations.

Glynn et al. (1973) evaluated the effect of all four self-control components on the on-task behavior of a regular second-grade class in New Zealand. Students were instructed to record whether they were on or off-task when they heard a randomly presented auditory signal. Self-reported instances of on-task behavior earned time-off and back-up reinforcers. The results indicated that self-control procedures were effective in maintaining the high rate of on-task behavior established during the external-control condition. Further, it was noted that behavioral variances were smaller during the self-control phases of the study.

In an extension of their earlier study Glynn and Thomas (1974) evaluated the effectiveness of all four self-control components without an initial period of systematic external control. The nine most inattentive students in a regular third-grade class served as subjects for the experiment. The results indicated that on-task behavior increased when self-control procedures were used. Since there was no opportunity for reinforcement in the absence of self-control condition and the self-control condition was not replicated exactly, the results should be interpreted with caution.

The only investigation of the effectiveness of self-control procedures with mentally retarded (MR)/emotionally disturbed (ED) students was conducted by Shapiro and Klein (1978). These authors evaluated the effect of self-assessment and administration of reinforcement after initial exposure to external-control procedures. The results indicated that a high level of task accuracy was maintained in the self-control condition, while task performance continued to increase. Further, high levels of on-task behavior and low levels of disruptive behavior were maintained in the self-control phase. since there was no replication of the self-control condition or various fading steps, the results should be interpreted with caution.

The results of investigations concerning the effect of a combination of the self-control components on academic and academically related behaviors suggest the following:

1. Self-control techniques can be used by students with high rates of disruptive behavior to maintain low rates of disruptive behavior established by external-control procedures (Bolstad & Johnson, 1972; Drabman et al., 1973; Kaufman & O'Leary, 1972; Shapiro & Klein, 1978).

2. Self-control techniques may be effective with normal populations. However, failure to match conditions (Glynn & Thomas, 1974) and failure to replicate conditions (Glynn & Thomas, 1974) make such a conclusion very tentative.

3. Investigations concerning the effectiveness of self-control procedures with exceptional populations without an initial period of systematic external control are lacking.

Self-Reinforcement

The effect of self-reinforcement was first evaluated by Lovitt and Curtiss (1969). Specifically, these authors investigated the effect of self-reinforcement after an initial period of systematic teacher-imposed contingencies. The 12-year-old behaviorally disordered subject demonstrated a higher rate of correct math problem solution when he was allowed to determine the reinforcement contingencies. It should be noted that the median difference in response rate in the self- and external-control conditions was small. Thus, the increased effectiveness of the self-control condition should be interpreted with caution. The results do appear to demonstrate that self-reinforcement was effective in maintaining behavior established under an external-control condition.

Later studies (Glynn, 1970; Felixbrod & O'Leary, 1973, 1974) compared self-reinforcement and external-reinforcement groups thus demonstrating the effectiveness of self-reinforcement procedures without an initial period of systematic external reinforcement. Specifically, Glynn (1970) compared the effect of self- and external reinforcement on the academic behavior of a ninth-grade population of regular-class students. The results indicated that there was no statistically significant difference in the average number of history and geography test items answered correctly by the self- and external-control groups.

Felixbrod and O'Leary (1973) then compared the effect of self- and external reinforcement on a younger population of normal subjects. The results indicated that there was no statistically significant difference in the mean number of correct math solutions by the self- and external-control groups.

In a later study, Felixbrod and O'Leary (1974) again used an elementary school-aged normal population to compare the effects of self- and external reinforcement without an initial period of external control. The results indicated that there were no statistically significant differences in correct math problem solution or time on task of the self- and external-control groups. These findings support the results of the Glynn (1970) and Felixbrod and O'Leary (1973) studies which also investigated the effect of self-reinforcement on the academic behavior of a normal population. Thus, it appears that self- and external reinforcement are equally effective in improving the academic performance of normal students.

Neukater (1978) evaluated the effectiveness of self-reinforcement with six LD students in a psychiatric hospital. The effectiveness of self-determination of reinforcement after an initial period of external control was examined. Neukater found that self-control resulted in a significant increase in math performance and on-task behavior and decrease in disruptive behavior. These results should be interpreted with caution since the two conditions were not matched and initiation of a token economy resulted in decreased academic performance.

The results of investigations concerning the effect of self-reinforcement on academic and academically related behaviors suggest the following.

1. Self- and external reinforcement appear equally effective in improving the academic performance of normal students (Felixbrod & O'Leary, 1973, 1974; Glynn, 1970).

2. Self-reinforcement procedures may be effective with exceptional populations in maintaining behaviors established by external-control procedures (Lovitt & Curtiss, 1969; Neukater, 1978).

3. Investigations concerning the effectiveness of self-reinforcement with exceptional populations without an initial period of systematic external control are lacking.

Self-Monitoring

The effectiveness of self-monitoring was specifically investigated in three studies. In 1971, Broden and his colleagues (Broden et al., 1971) had a regular-class junior high school student record whether she was on- or off-task when she thought about it. Although the subject under study requested a program to improve her school performance and thus was highly motivated, on-task behavior increased from 30 percent in the baseline to 80 percent in the self-monitoring condition. Another subject in the Broden et al. (1971) study recorded every time he talked-out in class. The results indicated that talk-outs decreased from 1.1 in Session A and 1.6 in Session B to .3 and 1.0 respectively in the self-monitoring condition. Since the median difference in frequency of talk-outs in the two conditions was small the results of this study should be interpreted with caution.

Lovitt (1973) also investigated the effectiveness of self-monitoring with normal students. One of Lovitt's subjects was instructed to record every time she talked-out. The results indicated that talk-outs decreased in the self-monitoring condition. Since the median difference in response rate in the self- and external-control conditions was small and an AB experimental design was used, the results should be viewed with caution.

Another student in the Lovitt (1973) investigation recorded hitting behavior. Rate of hits decreased in the self-monitoring condition and hitting was completely eliminated when the subject ripped up his self-monitoring card and refused to self-record any longer.

Hallahan et al. (1979) conducted the only investigation which specifically evaluated the effectiveness of self-monitoring procedures with an exceptional student. A tape-recorder cued self-monitoring procedure developed by Glynn et al. (1973) was used to signal self-recording. The results indicated that the self-monitoring procedure was effective in increasing the on-task behavior and handwriting and math productivity of a seven-year-old LD student with attention problems.

The results of investigations concerning the effect of self-monitoring on academic and academically related behaviors suggest the following.

1. Self-monitoring may be effective with normal populations (Broden et al., 1971; Lovitt, 1973). However, small median differences in the self- and external-control conditions suggest the need for further research.

2. Investigations concerning the effectiveness of self-monitoring with exceptional populations are limited.

Spelling

The majority of studies which investigated the effect of self-control on an academic behavior examined the fluency building level of task performance. Research concerning the effect of self-control procedures during the acquisition stage of learning is limited to an investigation by Glynn (1970). Glynn compared the effect of self- and external determination of reinforcement on the number of test items answered correctly after students heard a lecture and read a passage in social studies. The academic task decided upon in this study was spelling. Spelling was selected because it is an acquisition task in which the number of items to be acquired is potentially unlimited.

Regardless of the method of spelling instruction a teacher chooses isolated word presentation and study is a necessary component of spelling instruction (Hildreth, 1955; Zyne, 1931). Hildreth (1955) suggests that not all students learn words by the same techniques. She recommends that each student should be encouraged to determine for him/herself how a word should be studied; however, a student should not be left unaided to work out any system he/she please or no system at all (Hildreth, 1955). Further, Hildreth (1955) recommended that a student be required to read potential drill words since drill on a word avails nothing if the word cannot be read by the student (Hildreth, 1955).

Research has been conducted concerning the amount of time that should be devoted to spelling instruction. Research in spelling suggests (Allred, 1977) that children do not benefit from extended periods of spelling instruction, i.e., students benefit as much from a 20-minute session as a 40-minute session. Evidence indicates that the most valid method to test spelling involves the following steps (Horn, 1954).

1. The examiner pronounces the word.
2. The examiner uses the word in a sentence.
3. The examiner pronounces the word again.
4. The word is written by the student.

The assessment of retention is also of interest in spelling instruction. Various terms have been employed to help clarify the temporal aspects of memory processing. Currently, the concensus of investigators is that inputs are transferred from sensory memory with a duration of a few hundred milliseconds to a primary memory system with a storage duration of several seconds and finally to a more permanent secondary memory system where information can be stored for minutes or years (Hecaen & Albert, 1978; Landauer, 1977; Waugh & Norman, 1965). An example of the decay in the information flow of memory was provided by Landauer (1977) who explained that there is a rapid decay of memory during the first 30 minutes after learning. After this initial drop there is little decay so that what can be remembered after 30 minutes can be remembered after 30 hours and 30 days (Landauer, 1977).

Applied Behavior Analysis

Applied behavior analysis (ABA) is a method of research which involves the analysis of individual behavior. In ABA the effect of a variable on behavior is demonstrated by the presentation and removal of the variable. The theoretical basis for ABA was provided by Skinner (1953). Sidman (1960) comprehensively described the ABA method of research. Research using within-subject ABA designs has been published in the *Journal of Experimental Analysis of Behavior* since 1957 and the *Journal of Applied Behavior Analysis* since 1968. Several advantages of the within-subject design used in ABA are

1. Variability due to intersubject differences is eliminated.
2. The behavior change of the individual is not obscured.
3. There are no mathematical abstractions involved.
4. Replication within or across subjects is built into the design.

Evidence that an experimental procedure caused a change in behavior is provided through various single-subject research designs.

The reversal design is one of the most powerful ABA designs that can be used to demonstrate the controlling effect of the experimental treatment on the behavior under study (Bailey, 1977). In the initial A phase of this design a behavior is measured. The experimental variable is applied in the B phase. In the second A phase the experimental variable is discontinued or altered to see if any behavior change that might have been observed in Phase B is dependent on the experimental variable under investigation. The final phase of the reversal design, the second B phase, involves a reapplication of the experimental variable to see if any behavioral change observed in the initial B phase can be recovered. Examples of the use of the ABAB experimental design in education research are provided in articles by Lahey, McNees, and Brown (1973) and Goetz and Baer (1973).

It is frequently difficult to retrieve the original level of responding in the third phase of the ABAB design. Hersen and Barlow (1976) recommend short periods of treatment application to counteract for this carryover effect. A measured reversal of one-third to two-thirds of the level measured during intervention has been recommended as a sufficiently convincing reversal (Sulzer-Azaroff & Mayer, 1977).

Barlow and Hersen (1973) cite the advantages of obtaining a relatively equal number of data points for each phase. They suggest that by extending the length of the treatment phase it is not clear whether other variables, e.g., additional treatment, may account for any changes that might be observed.

CHAPTER III

METHOD

Chapter III is divided into six major sections. The sections include a description of the subject selection criteria, setting, assessment, treatment, and design.

Subject Selection Criteria

The sample of LD students used in this experiment was obtained from a population of LD students attending the P. K. Yonge Laboratory School LD Summer School Program. Students attending the LD Summer School Program were screened in random order using the following selection criteria until four students were identified. Descriptive data on the subjects participating in the study are presented in Appendix B. Randomization was achieved by assigning a number to each name on a master list of students attending the summer school program. A table of random numbers was then consulted to order the names. In order to qualify for inclusion in the study each subject met the following criteria.

1. Each student was diagnosed as LD based on Alachua County guidelines for placement of LD students (see Appendix A).

2. Each student was enrolled in the P. K. Yonge LD Summer School Program.

3. Each student was able to read at the second grade level or better. Reading levels were obtained from the 1980 Metropolitan Achievement Test Reading Subtest scores reported in the student's cumulative folder.

4. Each student demonstrated the ability to write the letters of the alphabet correctly. The principal investigator assessed writing performance on the first day of the experiment by asking each student to "Write the letters of the alphabet." Adequacy of legibility was based on a subjective judgment by the researcher.

5. Each student's hearing and vision was normal or corrected to normal (see Appendix A). A notation in the cumulative folder indicating that the student had passed a hearing and vision screening test within the past year served as evidence that the student met this criterion.

6. Each student's regular LD teacher and parent wrote "spelling" on the summer school application when asked, "What academic skills do you think need special help this summer?"

It was originally intended to screen out students whose Intelligence Quotient (IQ) was above 120 or below 90 using the standardized intelligence test administered as part of the testing for special placement. Since screening using criteria one through six eliminated all but four of the Summer School participants, and only two of the four remaining students were within the 90-120 IQ range, the IQ criterion was eliminated.

Setting

The experiment was conducted at P.K. Yonge Laboratory School. Classes for the LD Summer School Program were held from 8 until 11 o'clock in the morning, Monday through Thursday, for a seven week period. The pupil teacher ratio in each class was eight students to two teachers. Experimental sessions were conducted in the classroom to which three of the four subjects were assigned. Classroom activities continued as usual. The tape recorded used in the experiment was located on a desk near an electrical outlet.

Assessment

Materials

The Harbrace Spelling Program Teacher's Edition (Madden & Carlson, 1974) was used to provide word lists and sentences for use in assessment. A random list of the words at each grade level was produced, i.e., third, fourth, fifth, and sixth grades. To achieve randomization, the words from each speller, with the exception of proper nouns, contractions, and homonyms were printed on slips of paper. The slips were drawn to obtain a list of words at each grade level. Each student was provided with an 8½ by 11 inch sheet of notebook paper and a pencil before the spelling assessment.

Procedures

Assessment. Testing to determine treatment words, i.e., pretesting, was conducted in the classroom with the students and principal investigator seated at a table (see Appendix C for exact instructions). Assessment began at the third-grade level for all subjects. Testing format followed that recommended by Horn (1954), i.e., the examiner pronounced the word orally, used the word in the context of a sentence, again pronounced the word orally, and the student wrote the word. Pretesting was conducted for 15 minutes on the first day of the experiment. Further testing to obtain treatment words was conducted individually as needed, beginning with the next word on the randomized spelling list.

The principal investigator asked the student to read each of the words misspelled in the pretest. Only words that could be read by the student were used as treatment words.

Posttesting of treatment words took place immediately after each experimental session. Each word list was assessed again before the next experimental session to evaluate retention. Feedback concerning performance on the spelling assessment measures was not given to the student at any time during the experiment.

The principal investigator scored the student's written responses after each testing session using a procedure recommended by White and Haring (1976). In the White and Haring procedure each sequence of letter-to-letter within the word is scored. A point is awarded for each correct sequence and deducted for each incorrect sequence. The first sequence in a word is blank-to-first-letter and the last sequence is last-letter-to-blank. Thus there is always one more sequence than letters in the word. Sequences were marked by placing a caret over every correct sequence and a check under every incorrect sequence. Examples of scoring possibilities are provided below.

^^^^^^^^
1. Seattle is an example of eight correct sequences and would earn eight points.

^^ ^^^^
2. Settle has one letter left out and would be scored as six
✓
correct sequences and one incorrect sequence.

^^ ^^^^^
3. Seqattle has a new letter inserted and would be scored as
✓✓
seven correct and two incorrect sequences.

Determination of Study Method. The method of independent study was worked out individually for each student. Initially the student was provided with a brief description of ways that spelling words can be studied.

Suggested study techniques included the following.

1. The student was advised that he could look at the word, spell it either aloud or to himself several times, then look away and spell the word.

2. The student was advised that he could look at the word, spell it either aloud or to himself several times, turn the treatment card over and spell the word, then look to see if he spelled the word correctly.

3. The student was advised that he could look at the word, spell it either aloud or to himself several times, turn the treatment card over and write the word on a sheet of paper, then compare his spelling to the treatment card to see if he spelled the word correctly.

Acquisition of at least three of the treatment words was arbitrarily set as the criterion for an adequate study technique.

Treatment

Materials

Treatment Words. The first 15 words that the subject misspelled on the spelling pretest were printed individually on white unlined 3 by 5 inch index cards. The deck of treatment words was shuffled and given to the student before each experimental session. Treatment words spelled correctly in the posttest were removed from the deck of treatment words and an equal number of new words from the randomized word list were added. Each phase of the study was begun with 15 new words.

Independent Study Tape. The independent study tape provided the student with information on when to start and when to stop studying the treatment words. The tape began with the statement, "Start," and after 10 minutes instructed the student to "Stop." Experimental tapes were recorded using a Marantz tape recorder (Model 5420) with the Microphone Level input control set at eight, and the Master Level control set at seven. The microphone was placed two feet from the speaker. Experimental tapes were recorded in a two room sound suite of a Veterans Administration Medical Center.

Independent Study Plus Self-Monitoring Tape. The tape used in the second and fourth phases of the study was similar to the independent study tape with the exception of the cue to self-monitor, the critical feature of the experiment. The independent study plus self-monitoring tape begins with the command "Start" which is followed by a series of intermittent beeps. The beeps were produced by a Grason-Stadler 1701 Audiometer set at 65 decibels

(1000 Hertz) output level sound field. Intervals between the beeps vary randomly from 18 seconds to 88 seconds with a mean interval of 60 seconds. Thus an average of 10 beeps occur in each 10-minute study period. The beeps are of two-second duration. The command "Stop" concludes the 10-minute independent study plus self-monitoring tape. In order to avoid prediction of the self-monitoring signal six treatment tapes each with different random intervals were made. Further, the tapes were presented to the student in random order. Randomization for presentation order was achieved by finding the first 15 occurrences of the numbers one through six in a table of random numbers. If a number appeared twice in a row the second occurrence was discarded so that the subject never heard the same tape twice in a row.

Self-Monitoring Card. Before every session in the independent study plus self-monitoring phase the student was provided with a self-monitoring card to keep track of his studying behavior. The 3 by 5 inch self-monitoring card had a space for the student's name, the date, and the session number, followed by a row of 14 squares (see Appendix E for a diagram of the self-monitoring card).

Procedures

Phase 1. During the first phase of the study the student was provided with the independent study tape. The principal investigator explained that the tape provides information on when to start and when to stop studying the spelling words. At the beginning of this and every session in the study the student was provided with a deck of 15 treatment words. The student was given instructions to "Try and learn as many words as possible during the 10 minutes the tape is on" (see Appendix F for exact instructions). After 10 minutes had elapsed the student took the posttest. Retention was assessed at the beginning of the next experimental session. Experimental sessions were conducted twice a day, Monday through Thursday, with the exception of pupil absences. No other spelling instruction was provided to the experimental subjects until data collection had been completed.

Each student's study behavior was evaluated one time during each independent study phase. During the observation sessions the principal investigator started her tape recorder when the subject was seen starting his tape. The principal investigator listened to a tape from the self-monitoring phase and on signal recorded the subjects behavior on a Behavior Observation Checklist (see Appendix H). The researcher was seated at a table approximately three feet from the subject. Selection of a session for observation was randomly determined. An estimate of intraobserver agreement was obtained on one student during each phase of the study. The second observer was a teacher consultant with eight years of teaching experience who frequented the classroom. Thus her presence in the classroom, like that of the principal investigator, was not unusual. The session used to obtain an estimate of observer agreement was randomly determined. An estimate of intraobserver agreement was calculated by dividing the total number of observations into the number of agreements and multiplying by 100 (Wasik, Senn, Welch, & Cooper, 1969). Interobserver agreement of 80 percent was considered adequate.

Phase 2. During the second phase of the study the student was introduced to the self-monitoring procedure. The investigator told the student that she wanted him to keep track of when he was and when he was not studying the spelling words. Basically the training procedures used were identical to those recommended by Mahoney (1977) and used by Hallahan et al. (1979). First the investigator defined and provided examples of studying appropriate for each student's particular study method. Second, the student was instructed how to mark the self-monitoring card when he heard a beep. Third, the investigator modeled the use of the self-monitoring card. Fourth, the student was asked to give examples of studying as well as to repeat the self-monitoring instructions. Fifth, the student demonstrated the self-monitoring procedure when provided with trial beeps. The entire training procedure took about 10 minutes to complete. The procedure was conducted on the first day of each phase and was reviewed briefly following breaks in routine, e.g., after an absence. The student's self-monitoring performance was checked on the first day of the experiment by comparing the number of boxes marked on the self-monitoring card to the number of self-monitoring cues presented on the tape. The accuracy of each student's self-monitoring was evaluated one time during each self-monitoring phase using the observation procedures previously described. The observers listened to a duplicate of the self-monitoring tape being used by the subject during these observation sessions.

Phase 3. The independent study tape was reintroduced in Phase 3. This reversal was to ascertain whether the self-monitoring procedures were responsible for any effects that might have been observed in Phase 2.

Phase 4. In Phase 4 the procedures in effect during the independent study plus self-monitoring phase were reinstituted.

Design

Data on the percent of spelling letters and words acquired and retained were collected and recorded for six sessions in each phase of the study. The effect of the experimental manipulation was evaluated using a reversal design (Baer, Wolf, & Risley, 1968). The following graphic representation illustrates the basic design.

Subject				
1	Independent Study	Independent Study Plus Self-Monitoring	Independent Study	Independent Study Plus Self-Monitoring
2	Independent Study	Independent Study Plus Self-Monitoring	Independent Study	Independent Study Plus Self-Monitoring
3	Independent Study	Independent Study Plus Self-Monitoring	Independent Study	Independent Study Plus Self-Monitoring
4	Independent Study	Independent Study Plus Self-Monitoring	Independent Study	Independent Study Plus Self-Monitoring

CHAPTER IV

RESULTS

Four students enrolled in a summer school program for LD students were randomly selected for participation in a study to investigate the effect of self-monitoring of studying behavior on the acquisition and retention of spelling letters and words by LD students. (See page 32 for Subject Selection Criteria and Appendix B for Demographic Data on the Subjects.) To determine what effect, if any, self-monitoring of studying behavior might have on the acquisition and retention of spelling letters and words, a single-subject reversal design was used. Data were collected on each subject during four phases: independent study (baseline 1), independent study plus self-monitoring, independent study (baseline 2), and independent study plus self-monitoring. Specifically, the mean percent of words acquired by each subject during each phase of the study was calculated to answer Research Question 1: "What is the effect of self-monitoring of studying behavior on the percent of spelling words acquired by LD students?" The mean percent of words retained by each subject during each phase of the study was calculated to answer Research Question 2: "What is the effect of self-monitoring of studying behavior on the percent of spelling words retained by LD students?" The mean percent of letters acquired by each subject during each phase of the study was calculated to answer Research Question 3: "What is the effect of self-monitoring of studying behavior on the percent of spelling letters acquired by LD students?" The mean percent of letters retained by each subject during each phase of the study was calculated to answer Research Question 4: "What is the effect of self-monitoring of studying behavior on the percent of spelling letters retained by LD students?"

The percent change between phases for each of the dependent variables was calculated. This score was obtained by subtracting the second score from the first. For example, if a subject acquired 20 percent of the words in Phase 1 and 24 percent of the words in Phase 2, a 4 percent increase between Phases 1 and 2 would be indicated. The preset criterion for a significant change was 10 percent. (For a further discussion of this criterion see page 103.) A detailed presentation of the data collected relative to each subject's spelling performance may be found in Appendix I.

Verification of Studying Behavior

Each subject was observed once during each phase of the study to estimate the amount of studying behavior exhibited. The procedures described on page 39 and the Behavior Observation Checklist (see Appendix H) were used to complete these observations.

The number of intervals the study was observed to exhibit studying behavior was divided by the total number of intervals observed and then multiplied by 100 to obtain the percent of studying behavior exhibited. An examination of Table 2 indicates that the study behavior of the four subjects ranged from 30 to 92 percent during the sessions observed. The Standard Deviations (SD) for Subjects 3 and 4 appear quite large. Further, the mean percent of study behavior for the sessions observed suggests that Subjects 3 and 4 exhibited less studying behaviors than Subjects 1 and 2.

During the self-monitoring phases the Behavior Observation Checklist filled out by the principal investigator was compared to the Self-Monitoring Card filled out by the student to evaluate the accuracy of the subject's self-report (see page 40 for a description of this procedure). The agreements by phase and session are presented in Table 3. Examination of Table 3 suggests that the subjects were observed to exhibit study behaviors from 30 to 89 percent of the time during the observed sessions. Self-reports of studying behavior by Subjects 1 and 2 indicate that studying behavior occurred during 100 percent of the time during these sessions. The self-reports of Subjects 3 and 4 suggest that nonstudy behaviors were exhibited during the observed sessions. However, the percent of self-reports of studying behavior by these subjects was still much higher than the percent of observed study behavior.

Table 2

Percent of Session Engaging in Study Behaviors

Subject 1			Subject 2			Subject 3			Subject 4		
Phase	Session	Percent Study Behavior	Phase	Session	Percent Study Behavior	Phase	Session	Percent Study Behavior	Phase	Session	Percent Study Behavior
1	3	75%	1	5	92%	1	6	92%	1	5	66%
2	2	71%	2	4	89%	2	5	33%	2	3	30%
3	5	70%	3	5	92%	3	3	78%	3	1	66%
4	5	87%	4	4	75%	4	6	71%	4	6	60%
Range		70-87%	Range		75-92%	Range		33-92%	Range		30-66%
Mean		75.75%	Mean		87.00%	Mean		68.50%	Mean		55.50%
SD		7.8	SD		8.12	SD		25	SD		17.23

Table 3

Comparison of Subjects' Study Behavior Self-Reports and Observations of Study Behavior

Subject	Phase	Session	Self-Report	Observation
1	2	2	100%	71%
1	4	5	100%	87%
2	2	4	100%	89%
2	4	4	100%	75%
3	2	5	100%	33%
3	4	5	90%	71%
4	2	3	90%	30%
4	4	6	87%	60%

To verify that the principal investigator identified the subjects' studying behavior an estimate of interobserver agreement was obtained (see description on page 39). The agreement scores for each phase of the study are presented in Table 4. No interobserver agreement score was less than 88 percent.

Table 4

Interobserver Agreement

	Phase			
	1	2	3	4
Session	3	3	3	6
Subject	1	4	3	2
Number of Intervals	10	10	9	8
Number of Intervals Observed On Task By Observer	7	4	7	7
Number of Intervals Observed on Task by Principal Investigator	7	3	7	6
Agreement	100%	90%	100%	88%

Analysis of Data for Each Subject

Data obtained on the dependent variables are presented for each subject. The dependent measures will be discussed relative to the question each was designed to address. The format for each discussion is: visual inspection of the data, significance of the percent change across phases, and relevant observations made during the study.

Subject 1

Subject 1 was a nine-year-old fourth-grade white male placed in a resource room LD program. This subject was reported to have an IQ of 105, and a reading grade level of 3.4. In the most recent year of school (1979-80) his reported spelling grades for the six grading periods were N, N, N, N, S, S (N = needs improvement, S = satisfactory).

Question 1: Percent of Words Acquired. A graphic display of the percent of words acquired per session by Subject 1 is presented in Figure 1. Examination of Phase 1 (the initial baseline phase) indicates that the percent of words acquired for the first session began at 40 percent, decreased in Sessions 2 and 3, and returned to 40 percent in Sessions 5 and 6. The mean for percent of words acquired in Phase 1 was 32.17 percent. In the second phase of the study (the initial self-monitoring phase) the percent of words acquired began at 53 percent, decreased during Session 8, followed by an increase in Session 9, and decrease during the last three sessions of the phase. The mean for the second phase was 39.00 percent. The percent of words acquired in Phase 3 (the second baseline phase) began at 40 percent, increased in Session 14, and decreased in Session 15. An increasing trend can be seen in Sessions 16 and 17 followed by a steep decrease in Session 18. The mean for this phase was 39.83 percent. In Phase 4, the percent of words acquired began at 53 percent, decreased in Sessions 20 and 21, increased in Session 22, and followed a decreasing trend for the last two sessions of the phase. The mean percent of words acquired during Phase 4 was 43.17 percent.

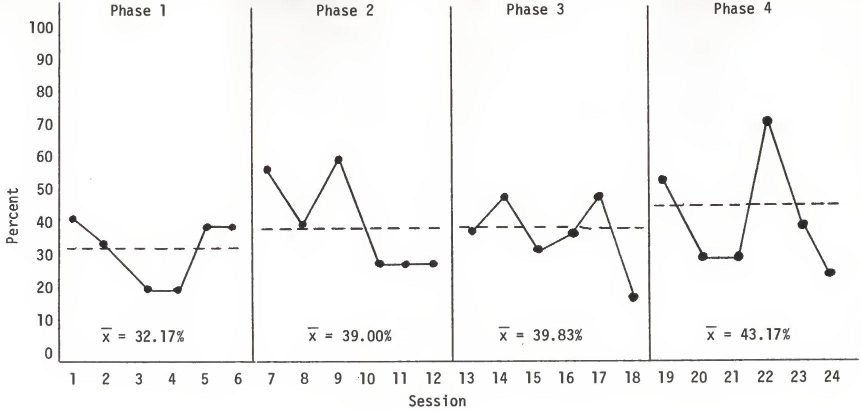

Figure 1

Percent of Words Acquired by Subject 1

The mean percent of words acquired by Subject 1 in each phase of the study may be found in Table 5. An examination of Table 5 indicates that the change in mean percent of words acquired did not meet the preset criterion for a significant change, i.e., at least a 10 percent change between phases, for any of the phases.

Question 2: Percent of Words Retained. The percent of words retained per session by Subject 1 is presented in Figure 2. Evaluation of Figure 2 suggests that the percent of words retained during the first (baseline) phase began at 53 percent, decreased during Sessions 2 and 3, increased during Sessions 4 and 5, and decreased again in Session 6. The mean for this phase was 35.50 percent. The percent of words retained for the first three sessions of Phase 2 (self-monitoring) was as high as the highest session in Phase 1 (baseline). The percent of words retained decreased in Session 10, increased in Session 11, and decreased in the final session of Phase 2. The mean percent of words retained in Phase 2 was 47.67 percent. The percent of words retained by Subject 1 during the third phase of the study began at 40 percent, decreased, then followed an increasing trend until Session 18. The mean percent for Phase 3 was 37.67 percent. The percent of words retained in Phase 4 (self-monitoring) began at 60 percent, decreased in Sessions 20 and 21, with a sharp increase in Session 22, and decreased again in Sessions 23 and 24. The mean for Phase 4 was 41.17 percent.

Table 5

Spelling Performance Within Phases: Subject 1

	Phase 1	Phase 2	Percent change between phases 1 and 2	Phase 3	Percent change between phases 2 and 3	Phase 4	Percent change between phases 3 and 4
			Acquisition				
Percentage of Words Correct							
Mean	32.17%	39.00%	+ 6.83%	39.83%	+ .83%	43.17%	+ 3.35%
SD	9.81	14.63		12.54		17.12	
Percentage of Letters Correct							
Mean	63.17%	64.50%	+ 1.33%	65.40%	+ .90%	70.33%	+ 4.93%
SD	5.81	8.12		6.27		9.73	
			Retention				
Percentage of Words Correct							
Mean	35.50%	47.67%	+12.17%*	37.67%	-10.00%*	41.17%	+ 3.50%
SD	12.36	13.13		8.98		15.35	
Percentage of Letters Correct							
Mean	63.33%	70.00%	+6.67%	61.50%	- 8.50%	70.00%	+ 8.50%
SD	6.95	4.38		6.72		9.44	

+ represents an increase from previous phase.
- represents a decrease from previous phase.
* indicates ≥ 10 percent change.
SD = Standard Deviation

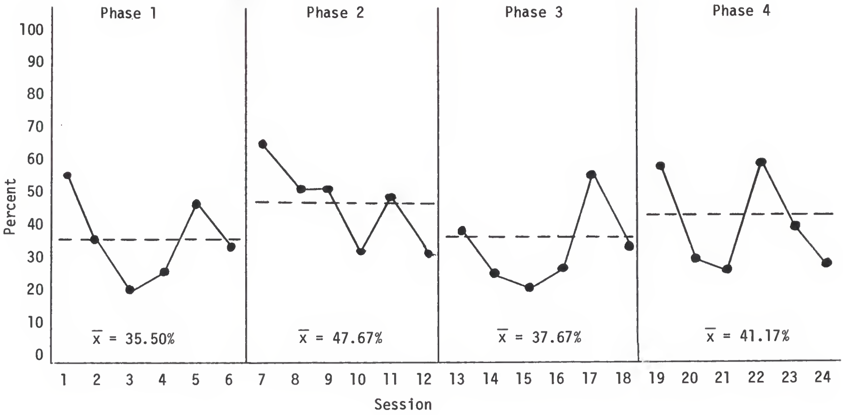

Figure 2

Percent of Words Retained by Subject 1

The mean percent of words retained by Subject 1 in each phase of the study may be found in Table 5. Examination of Table 5 reveals that 35.50 percent of the words were retained in Phase 1 and 47.67 percent of the words were retained in Phase 2. These scores represent a 12.17 percent increase between Phases 1 and 2. The percent of words retained in Phase 3 was 37.67 percent indicating a 10 percent decrease between Phases 2 and 3. The percent change between Phases 3 and 4 did not meet the preset significance criterion.

Question 3: Percent of Letters Acquired. A display of the percent of letters acquired per session by Subject 1 is presented in Figure 3. Examination of Figure 3 indicates that the percent of letters acquired decreased during the first part of the baseline phase and increased during the second part. The mean was 63.17 percent for Phase 1. During the first session of Phase 2 (self-monitoring) Subject 1 acquired a greater percent of letters than during any session of Phase 1. Sessions 8, 9, and 10 indicate a declining trend followed by an increasing trend in Sessions 11 and 12. The mean for Phase 2 was 65.40 percent. The percent of letters acquired by Subject 1 during the second baseline phase (Phase 3) began at 65 percent, increased during Session 14, decreased during the next session, followed by an increasing trend in Sessions 16 and 17, and a decrease in Session 18. The mean for this phase was 65.40 percent. In Phase 4 (self-monitoring) the percent of letters acquired began at 76 percent, increased

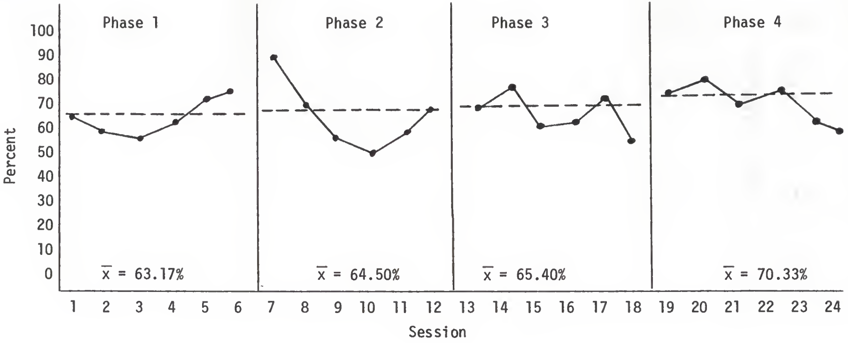

Figure 3
Percent of Letters Acquired by Subject 1

during Session 20, decreased during Session 21, followed by an increase in Session 22, and a decreasing trend in the last two sessions. The mean for percent of letters acquired in Phase 4 was 70.33 percent.

The mean percent of letters acquired by Subject 1 in each phase of the study may be found in Table 5. An examination of the table suggests that the change in mean percent of letters acquired did not meet the preset significance criterion for any of the phases.

Question 4: Percent of Letters Retained. A display of the percent of letters retained per session by Subject 1 is presented in Figure 4. Visual inspection of the figure reveals that the percent of letters retained by Subject 1 began at 73 percent, decreased during the first half of Phase 1 (baseline) and exhibited little upward or downward trend during the last three sessions. The mean percent of letters retained in Phase 1 was 63.33 percent. In the first session of Phase 2 (self-monitoring) Subject 1 retained a greater percent of letters than during any session of Phase 1. Sessions 8, 9, and 10 of the phase indicate a decreasing trend while Sessions 11 and 12 indicate little upward or downward trend. The mean for Phase 2 was 70.00 percent. The percent of letters retained in Phase 3 (baseline) by Subject 1 began at 67 percent and indicated alternating decreasing and increasing scores throughout the phase. The mean for this phase was 61.50 percent. In Phase 4 (self-monitoring) the percent of letters retained began

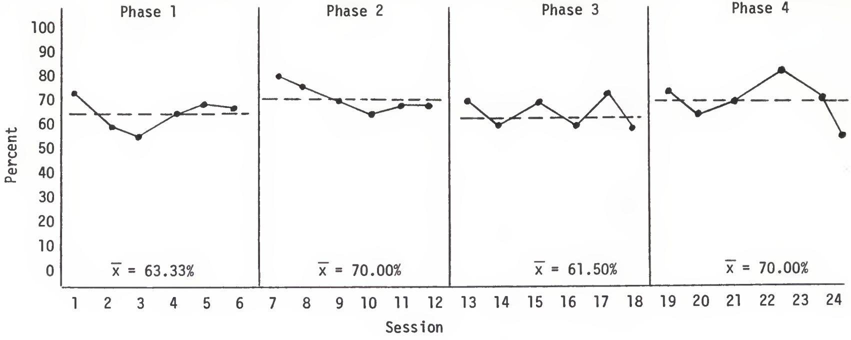

Figure 4

Percent of Letters Retained by Subject 1

at 78 percent, decreased during Session 19, followed by an increasing trend during Sessions 21 and 22, and a decreasing trend during Sessions 23 and 24. The mean for percent of letters retained in Phase 4 was 70.00 percent.

The mean percent of letters retained by Subject 1 in each phase of the study may be found in Table 5. An examination of Table 5 suggests that the change in percent of letters retained by Subject 1 did not meet the preset significance criterion for any of the phases.

Behavioral Observations. During the second baseline phase (Phase 3) Subject 1 made several comments indicating that he was glad he did not have to listen to the self-monitoring beeps anymore. He stated that the beeps were distracting and interrupted his studying.

Subject 1 was also noted to reverse a letter or several letters (e.g., b for d, ru for ur) on the spelling acquisition and retention measures. These reversals would result in misspelled words on the dependent measures.

During the verification of studying behavior observation on the fifth session of Phase 4, Subject 1 was observed to ignore the cue to self-monitor and fill in several of the boxes on the self-monitoring card at one time. This behavior was also observed on the sixth session of Phase 4. It is not known if the subject self-monitored correctly during the first four sessions of this phase.

It should also be noted that the treatment words from the third-grade spelling list were exhausted in the middle of Phase 4. Thus the new treatment words added for Sessions 4 through 6 were from the fourth-grade spelling list.

Subject 2

Subject 2 was an eleven-year-old fifth grade white male placed in a resource room LD program. This subject was reported to have an IQ of 76, and a reading grade level of 2.9. In the most recent year of school his reported spelling grades were C, C-, C-, U, U, and D for the six grading periods.

Question 1: Percent of Words Acquired. A display of the percent of words acquired per session by Subject 2 is presented in Figure 5. Visual inspection of Figure 5 indicates that 47 percent of the words were acquired in Session 1 followed by a decreasing trend in the first part of the phase and an increasing trend in the second part. The mean percent of words acquired in Phase 1 (baseline) was 22.17 percent. The percent of spelling words acquired during the first three sessions of Phase 2 (self-monitoring) was as high or higher than the best score in the first phase of the study. The percent of words acquired alternately decreases and increases throughout the phase. The mean was 46.50 percent. In Phase 3 (baseline) 33 percent of the words were acquired in the first session, followed by a decrease in Sessions 14 and 15, and alternating increasing and decreasing scores for the remainder of the phase. The mean for this phase was 25.33 percent. In Phase 4 (self-monitoring)

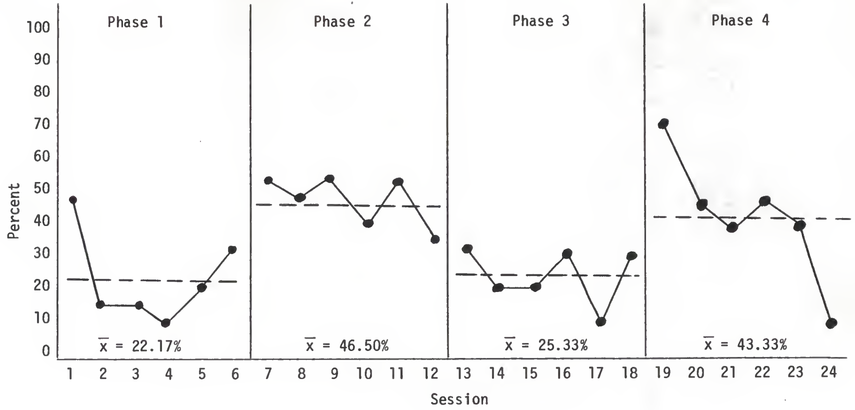

Figure 5

Percent of Words Acquired by Subject 2

Subject 2 acquired 73 percent of the words in the first session, followed by decreasing scores in Sessions 20 and 21, an increase in Session 22, and decreasing scores for the rest of the phase. The mean percent of words acquired in Phase 4 was 43.33 percent.

The mean percent of words acquired by Subject 2 in each phase of the study may be found in Table 6. An examination of the table reveals that 22.17 percent of the words were acquired in Phase 1, 46.50 percent in Phase 2, 25.33 percent in Phase 3, and 43.33 percent in Phase 4. These scores represent a 24.33 percent increase between Phases 1 and 2, a 21.17 percent decrease between Phases 2 and 3, and an 18.00 percent increase between Phases 3 and 4 respectively. All of these scores meet the preset criterion for a significant change.

Question 2: Percent of Words Retained. The percent of words retained per session by Subject 2 is displayed in Figure 6. Examination of the figure indicates that the percent of words retained during the first baseline phase started at 40 percent, alternately decreased and increased in Sessions 2 through 5, and remained at 27 percent in Session 6. The mean percent of words retained in Phase 1 was 23.33 percent. The percent of words retained during Phase 2 started at 47 percent, decreased to 40 percent for Sessions 8, 9, 10, and 11, and decreased to 33 percent in Session 12. The mean was 40.00 percent for this phase. In Phase 3 (baseline) 27 percent of the words were retained in the first session followed by alternating increasing and decreasing scores throughout the phase. The mean for this phase was 33.33

Table 6

Spelling Performance Within Phases: Subject 2

	Phase 1	Phase 2	Percent change between phases 1 and 2	Phase 3	Percent change between phases 2 and 3	Phase 4	Percent change between phases 3 and 4
Acquisition							
Percentage of Words Correct							
Mean	22.17%	46.50%	+24.33%*	25.33%	-21.17%*	43.33%	+18.00%*
SD	15.08	8.38		8.78		19.23	
Percentage of Letters Correct							
Mean	62.50%	77.33%	+14.83%*	73.33%	- 4.00%	76.50%	+ 3.17%
SD	10.37	4.41		4.13		8.24	
Retention							
Percentage of Words Correct							
Mean	23.33%	40.00%	+17.11%*	33.33%	- 6,67%	38.83%	+ 5.50%
SD	10.29	4.43		12.08		13.70	
Percentage of Letters Correct							
Mean	60.17%	73.67%	+13.50%*	74.83%	+ 1.16%	76.17%	+ 1.34%
SD	7.68	4.03		4.07		5.32	

+ represents an increase from phase to phase.
- represents a decrease from phase to phase.
* indicates ≥ 10 percent change.
SD = Standard Deviation.

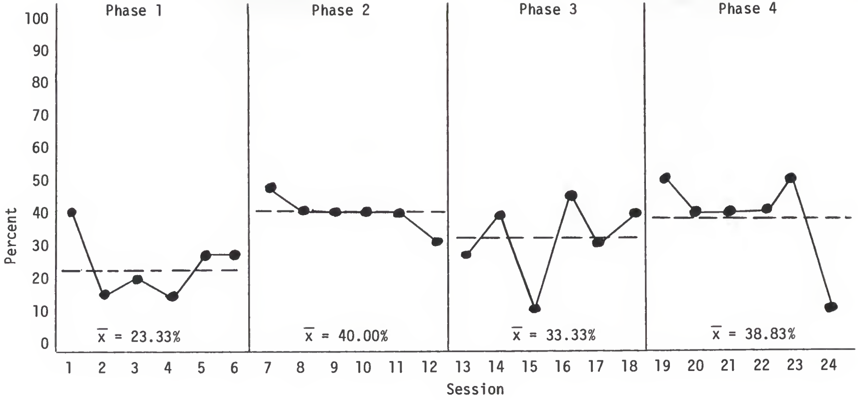

Figure 6

Percent of Words Retained by Subject 2

percent. The percent of words retained by Subject 2 in Phase 4 (self-monitoring) began at 53 percent, decreased to 40 percent for Sessions 20 through 22, increased in Session 23, and decreased in the final session. The mean for the phase was 38.83 percent.

The mean percent of words retained by Subject 2 in each phase of the study may be found in Table 6. Inspection of the table reveals that 23.33 percent of the words were retained in Phase 1 and 40 percent in Phase 2. These scores represent a 17.11 percent increase between Phases 1 and 2. The percent change between Phases 2 and 3 and Phases 3 and 4 did not meet the preset significance criterion.

Question 3: Percent of Letters Acquired. The percent of letters acquired by Subject 2 is presented in Figure 7. Examination of the figure suggests that the percent of letters acquired started at 80 percent, decreased during Sessions 2 through 4, and increased in the last two sessions. The mean was 62.50 percent for Phase 1. During the first session of Phase 2 (self-monitoring) Subject 2 acquired a greater percent of letters than during any session of Phase 1. The percent of letters acquired began at 83 percent in Phase 2 and alternately decreased and increased throughout the phase. The mean percent of letters acquired during Phase 2 was 77.33 percent. The percent of letters acquired by Subject 2 in Phase 3 began at 71 percent, decreased to 69 percent in Session 14, increased during Sessions 15 and 16, and decreased during the last two sessions. The mean was 73.33 percent. In Phase 4 (self-monitoring) the percent of letters acquired started at 88 percent,

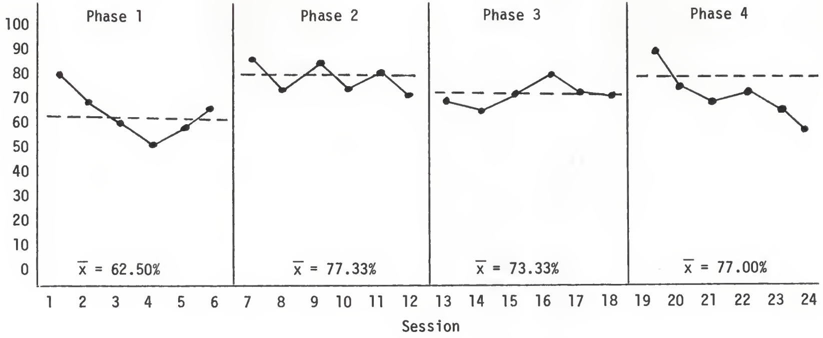

Figure 7

Percent of Letters Acquired by Subject 2

decreased during Sessions 20 and 21, followed by a slight increase in Session 22, and further decrease in the last two sessions. The mean percent of letters acquired in Phase 4 was 77.00 percent.

The mean percent of letters acquired by Subject 2 in each phase of the study may be found in Table 6. An inspection of Table 6 reveals that the change in mean percent of letters acquired between Phases 1 and 2 was 14.83 percent. The percent change between Phases 2 and 3 and between Phases 3 and 4 did not meet the preset significance criterion.

Question 4: Percent of Letters Retained. A display of the percent of letters retained per session by Subject 2 is presented in Figure 8. Visual inspection of the figure suggests that the percent of letters retained in Phase 1 began at 75 percent, decreased during Sessions 2 through 4, increased during Session 5, and decreased again in the last session. The mean percent of letters retained was 60.17 percent. In Phase 2 the percent of letters retained showed a decreasing trend for the first part of the phase and an increasing trend for the second part. The mean for this phase was 73.67 percent. The percent of letters retained by Subject 2 in Phase 3 began at 70 percent and increased and decreased alternately throughout the phase. The mean was 74.83 percent. The percent of letters retained in Phase 4 (self-monitoring) started at 83 percent, decreased to 75 percent in Session 20, showed little upward or downward trend in Sessions 21 through 23 then decreased sharply in the last session. The mean was 75.67 percent for this phase.

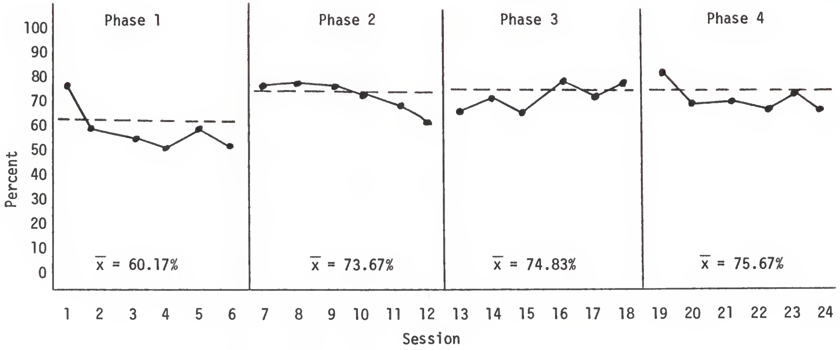

Figure 8

Percent of Letters Retained by Subject 2

The mean percent of letters retained by Subject 2 in each phase of the study may be found in Table 6. An examination of Table 6 reveals that the mean percent of letters retained increased 13.50 percent between Phases 1 and 2. The percent change between Phases 2 and 3, and Phases 3 and 4 did not meet the preset significance criterion.

Behavioral Observations. During Session 5 in the initial baseline phase Subject 2 was observed to study the treatment words approximately 30 seconds after the stop command on the independent study tape. Studying beyond the stop command was not noted in observations made during other phases of the study.

It should be noted that on the last session of Phase 4 Subject 2 had obtained permission to leave early for his birthday party and the length of the experimental session prevented him from doing so. It should also be noted that after the first self-monitoring phase treatment words were obtained from the fourth grade, rather than the third grade, spelling list as it appeared there would not be enough words to complete the last two phases using the third-grade list.

Subject 3

Subject 3 was an 11-year-old seventh-grade white male placed in a resource room LD program. This subject was reported to have an IQ OF 76, and a reading grade level of 2.7. In the most recent year of school his reported spelling grades were B-, B, B, B, B, and B for the six grading periods.

The sequence of phases for Subject 3 did not follow the sequence of phases for the other subjects. An explanation of the reasons for, and a description of these changes, follow. On the spelling pretest Subject 3 correctly spelled seven out of 28 (i.e., 25 percent) of the words at the third-grade level. Based on this pretest performance the spelling ability of this subject was judged to be poor by the principal investigator. For this reason she recommended that the subject look at the word, spell it either aloud or to himself several times, turn the word over and write the word on a sheet of paper, then compare his spelling to the treatment card to see if he spelled the word correctly. In a pilot study when a subject was switched to this study method, the number of spelling words acquired increased from a mean of three to a mean of 12. Using the write and self-correct study method Subject 3 acquired six spelling words during the first treatment session which met the preset criterion for an adequate study method, i.e., acquisition of three words. Observation of the subject and the pad he used while studying indicated that the determined study method was being used. It appeared that the subject could correctly spell the word when he assessed himself immediately after studying and yet the spelling posttest indicated that the subject was acquiring an average of 10 percent of the words per session (see Figure 9). Before the second baseline phase the principal investigator recommended that the subject count to five before writing the word he had studied. This modified procedure was labelled Period 1. Data from this phase indicate that this

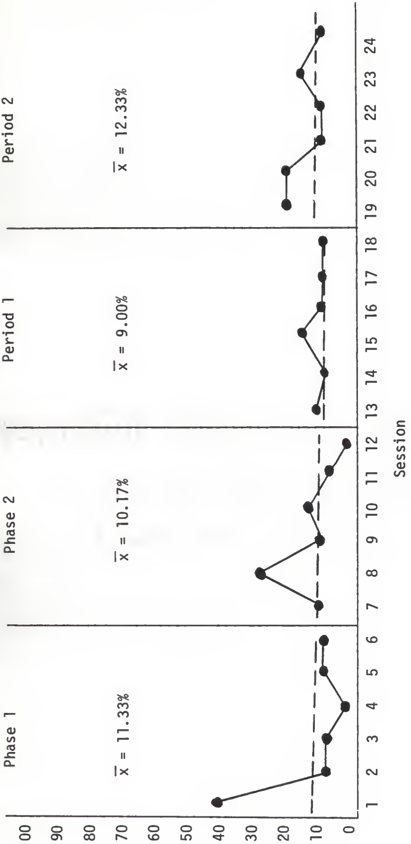

Figure 9

Percent of Words Acquired by Subject 3

additional step had little effect on the subject's performance on the spelling dependent measures (see Figures 9 through 12).

It was decided that reintroduction of the self-monitoring procedure would be meaningless at this point since the variables affecting the subject's spelling behavior had still not been identified. In a sense, the experiment for this subject was terminated and another begun. Another study method was attempted in Period 2. The student was instructed to look at the word, read it to himself, and point to and say each letter of the word to himself. The subject was to go through the above sequence three times, turn the treatment card over, count to 10, then write the word and self-correct it. As can be seen in Figures 9 through 12 this method was also ineffective in modifying the spelling behavior of Subject 3. A more detailed description of the performance of this subject on the spelling dependent measures follows.

Question 1: Percent of Words Acquired. A display of the percent of words acquired per session by Subject 3 is presented in Figure 9. Inspection of Phase 1 indicates that the percent of words acquired started at 40 percent, decreased to 7 percent in Sessions 2 and 3, decreased further in Session 4, followed by a return to acquisition of 7 percent of the words for the last two sessions. The mean was 11.33 percent for this phase. In the second phase of the study the percent of words acquired by Subject 3 began at 7 percent, increased to 27 percent in Session 8, decreased again in Session 9, followed by an increase in Session 10 and a decreasing trend for the remainder of the phase. The mean

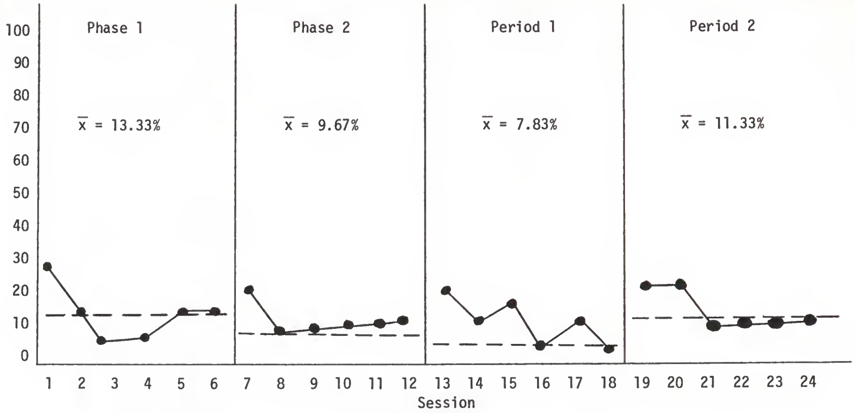

Figure 10

Percent of Words Retained by Subject 3

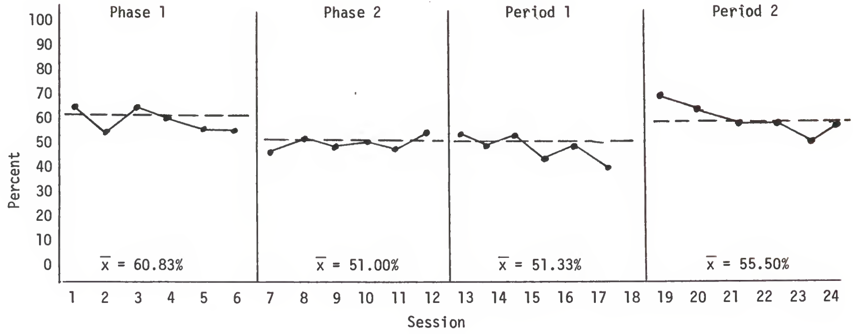

Figure 11

Percent of Letters Acquired by Subject 3

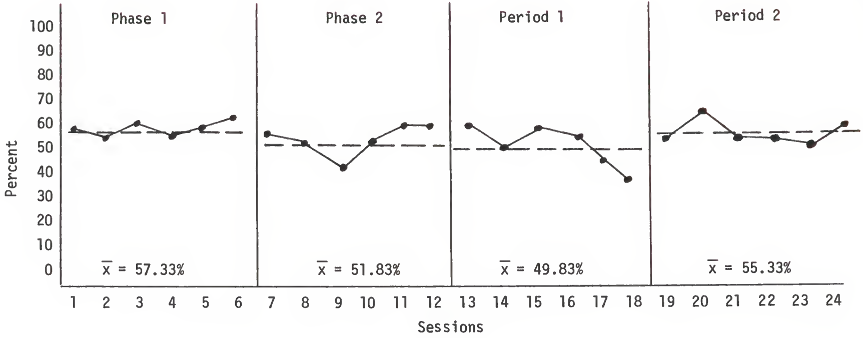

Figure 12

Percent of Letters Retained by Subject 3

Table 7

Spelling Performance Within Phases: Subject 3

	Phase 1	Phase 2	Percent change between phases 1 and 2	Period 1	Period 2
Acquisition					
Percentage of Words Correct					
Mean	11.33%	10.17%	- 1.16%	9.00%	12.33%
SD	14.32	9.22		3.10	6.38
Percentage of Letters Correct					
Mean	60.83%	51.00%	- 9.83%	51.33%	55.50%
SD	3.66	3.29		5.85	4.93
Retention					
Percentage of Words Correct					
Mean	13.33%	9.67%	- 3.66%	7.83%	11.33%
SD	7.31	7.19		7.73	6.71
Percentage of Letters Correct					
Mean	57.33%	51.83%	- 5.50%	49.83%	55.33%
SD	1.97	6.08		7.78	3.88

+ represents an increase from phase to phase.
- represents a decrease from phase to phase.
* indicates a ≥ 10 percent change.
SD = Standard Deviation.

percent of words acquired was 10.17 percent in Phase 2. The percent of words acquired in Period 1 began at 13 percent, decreased to 7 percent, increased to 13 percent again in Session 15, and decreased to 7 percent for the remainder of the phase. The mean for Period 1 was 7 percent of the words. In Period 2 the percent of words acquired started at 20 percent, dropped to 7 percent for Sessions 21 and 22, increased to 13 percent in Session 23, and dropped to 7 percent again in Session 24. The mean for Period 2 was 12.33 percent of the words.

The mean percent of words acquired by Subject 3 in the phases and periods of the study may be found in Table 7. An examination of Table 7 reveals that the percent of words acquired by Subject 3 in Phases 1 and 2 did not meet the preset significance criterion. The percent change between Periods 1 and 2 was not calculated since the phases represent baseline periods for two different study methods.

Question 2: Percent of Words Retained. A display of the percent of words retained per session by Subject 3 is presented in Figure 10. Examination of the figure reveals that the percent of words started at 27 percent, decreased in Session 2, stayed at 7 percent during Sessions 3 and 4, and increased to 13 percent for the last two sessions. The mean was 13.33 percent for this phase. The percent of words retained during Phase 2 started at 20 percent and dropped to 7 percent for Sessions 8 through 12. The mean percent of words retained by Subject 3 in Phase 2 was 9.67 percent.

The mean percent of words retained in each phase of the study by Subject 3 may be found in Table 7. Examination of Table 7 indicates that the percent of words retained in Phases 1 and 2 did not meet the preset criterion for a significant change.

Question 3: Percent of Letters Acquired. A display of the percent of letters acquired per session is presented in Figure 11. Visual inspection of the figure suggests that the percent of letters acquired began at 65 percent, decreased during Session 2, increased to 64 percent in Session 3, followed by a decreasing trend during Sessions 4 and 5, and a slight increase during Session 6. The mean for this phase was 60.83 percent. During Phase 2 the percent of letters acquired by Subject 3 began at 48 percent then increased and decreased alternately throughout the phase. The mean percent of letters acquired during Phase 2 was 51.00 percent.

The mean percent of letters acquired by Subject 3 in each phase of the study may be found in Table 7. An examination of the table indicates that the percent of letters acquired in Phases 1 and 2 did not meet the preset criterion for a significant change.

Question 4: Percent of Letters Retained. A display of the percent of letters retained per session by Subject 3 is presented in Figure 12. An examination of Phase 1 reveals that the percent of letters retained began at 50 percent, decreased and increased alternately through Session 5 and further increased in Session 6.

The mean was 57.33 percent for this phase. In Phase 2 the percent of letters retained by Subject 3 started at 55 percent, decreased during the first half of the phase, and increased during the second half. The mean for Phase 2 was 51.83 percent.

The mean percent of letters retained by Subject 3 in each phase of the study may be found in Table 7. An examination of Table 7 indicates that the percent of letters retained in Phases 1 and 2 did not meet the preset criterion for a significant change.

Behavioral Observations. Subject 3 asked the examiner to repeat instructions several times during the beginning of the study. A notation in the student's cumulative folder, however, indicated that his hearing was within normal limits.

It was also noted that Subject 3 appeared tired much of the time. Yawning behavior was noted by the principal investigator during every study session she observed.

Subject 4

Subject 4 was a nine-year-old fourth-grade white male placed in a resource room LD program. This subject was reported to have an IQ of 108, and a reading level of 3.5. In the most recent year of school his reported spelling grades were S-, S-, S-, S-, S-, and S for the six grading periods.

Question 1: Percent of Words Acquired. A graphic display of the percent of words acquired per session by Subject 4 is presented in Figure 13. Inspection of this figure reveals that the percent

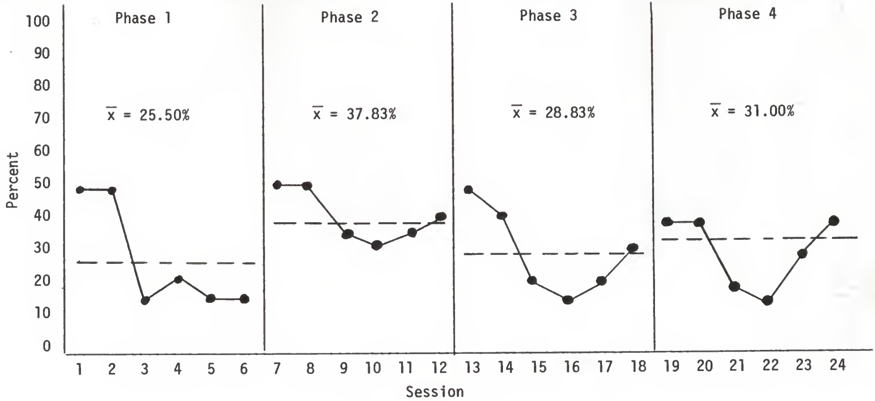

Figure 13

Percent of Words Acquired by Subject 4

of words acquired was 47 percent during Sessions 1 and 2, decreased during Session 3, increased in Session 4, and decreased to 13 percent during the last two sessions of the phase. The mean percent of words acquired during Phase 1 was 25.50 percent. In Phase 2 the percent of words acquired was 47 percent for the first two sessions, decreased for two sessions, and then increased for two sessions. The mean percent of words acquired during Phase 2 was 37.83 percent. The percent of words acquired in Phase 3 started at 47 percent, decreased through Session 16 and increased during the last two sessions. The mean for Phase 3 was 28.83 percent. During the fourth phase the percent of words acquired by Subject 4 was 40 percent for the first two sessions, decreased for the next two sessions, and increased during the final two sessions of the Phase. The mean for Phase 4 was 31 percent.

The mean percent of words acquired by Subject 4 in each phase of the study may be found in Table 8. An examination of Table 8 indicates that the percent of words acquired in Phases 1 and 2 were 25.50 percent and 37.83 percent respectively. These scores represent a 12.33 percent increase between the phases. The percent change between Phases 2 and 3, and Phases 3 and 4 did not meet the preset significance criterion.

Question 2: Percent of Words Retained. The percent of words retained by Subject 4 is displayed in Figure 14. Examination of the figure indicates that the percent of words retained started at 53 percent, decreased for the next two sessions, remained at 20 percent

Table 8

Spelling Performance Within Phases: Subject 4

	Phase 1	Phase 2	Percent change between phases 1 and 2	Phase 3	Percent change between phases 2 and 3	Phase 4	Percent change between phases 3 and 4
Acquisition							
Percentage of Words Correct							
Mean	25.50%	37.83%	+12.33%*	28.83%	- 9.00%	31.00%	+ 2.17%
SD	16.87	8.21		13.26		11.76	
Percentage of Letters Correct							
Mean	70.17%	67.67%	- 2.50%	66.83%	- 0.84%	70.83%	+ 4.00%
SD	6.62	6.28		3.31		7.63	
Retention							
Percentage of Words Correct							
Mean	27.67%	35.50%	+ 7.83%	25.50%	-10.00%*	27.67%	- 2.17%
SD	14.17	12.36		14.18		12.36	
Percentage of Letters Correct							
Mean	70.50%	65.67%	- 4.83%	66.00%	+ .33%	70.83%	+ 4.83%
SD	6.83	7.99		6.16		7.33	

+ represents an increase from phase to phase.
- represents a decrease from phase to phase.
* indicates ≥ 10 percent change.
SD = Standard Deviation.

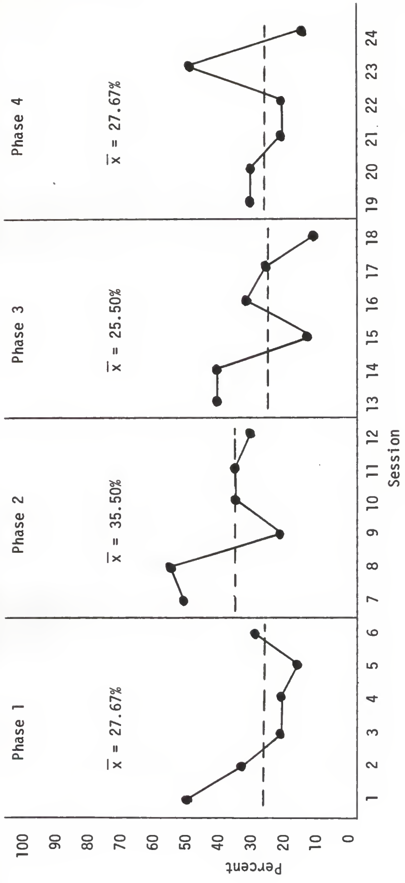

Figure 14

Percent of Words Retained by Subject 4

for Session 4, followed by a decrease in Session 5, and increase in Session 6. The mean percent of words retained in Phase 1 was 27.67 percent. In Phase 2 the percent of words retained began at 47 percent, increased in Session 8, decreased in Session 9, followed by an increase to 33 percent in Sessions 10 and 11, and a decrease in Session 12. The percent of words retained in Phase 2 was 35.50 percent. During Phase 3 the percent of words retained began at 40 percent for Sessions 13 and 14, dropped in Session 15, increased to 33 percent in Session 16, and decreased during the final two sessions. The mean for Phase 3 was 25.50 percent. In Phase 4 the percent of words retained started at 33 percent for Sessions 19 and 20, decreased to 20 percent for Sessions 21 and 22, followed by an increase in Session 22, and decrease in the final session of the phase. The mean percent of words retained in this phase was 27.67 percent.

The mean percent of words retained by Subject 4 in each phase of the study may be found in Table 8. Examination of Table 8 indicates that the percent of words retained in Phases 2 and 3 were 35.50 percent and 25.50 percent respectively. These scores represent a 10 percent decrease between Phases 2 and 3. The percent change between Phases 1 and 2, and Phases 3 and 4 did not meet the preset criterion for a significant change.

Question 3: Percent of Letters Acquired. A display of the percent of letters acquired by Subject 4 is presented in Figure 15. Visual inspection of Figure 15 indicates that the percent of letters

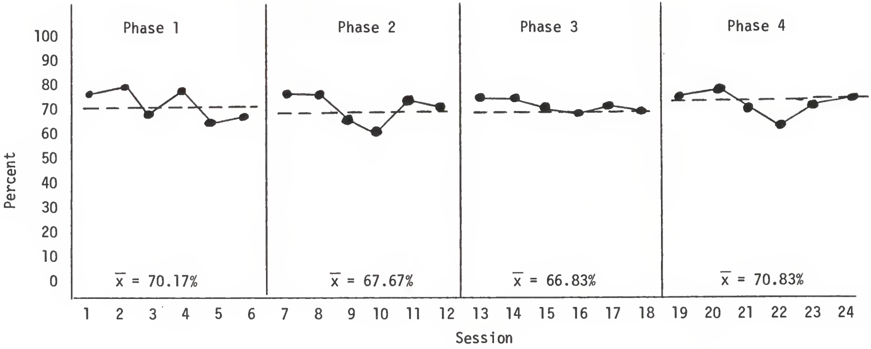

Figure 15

Percent of Letters Acquired by Subject 4

acquired during Phase 1 began at 74 percent, and alternately increased and decreased throughout the phase. The mean for percent of letters acquired in this phase was 70.17 percent. In Phase 2 the percent of letters acquired was 74 percent in Session 7 and 8, decreased during the next two sessions, followed by an increase in Session 11, and a 1 percent decrease in Session 12. The mean for this phase was 67.67 percent. The percent of letters acquired during Phase 3 was 71 percent for the first two sessions, decreased during the next two sessions, increased slightly in Session 17, and decreased slightly in the final session. The mean for Phase 3 was 66.83 percent. The percent of letters acquired in Phase 4 began at 72 percent, increased during Session 21, followed by a decrease in Sessions 22 and 23 and an increase in the final two sessions. The mean percent of letters acquired was 70.83 percent for Phase 4.

The mean percent of letters acquired by Subject 4 in each phase of the study may be found in Table 8. An examination of Table 8 reveals that the mean percent of letters acquired did not change significantly between any of the phases.

Question 4: Percent of Letters Retained. A display of the percent of letters retained per session is presented in Figure 16. Examination of the figure reveals that the percent of letters retained started at 78 percent, decreased during the next two sessions, remained at 71 percent during Session 4, followed by a decrease in Session 5, and increase in Session 6. The mean for this phase was 70.50 percent. In Phase 2 the percent of letters retained began at 74 percent, increased slightly during Session 8, decreased during the next two sessions, followed by an increase in Session 11, and decrease in Session 12. The mean percent of letters retained in Phase 2 was 65.67 percent. The percent of letters retained during Phase 3 began at 71 percent, increased and decreased alternately for the next four sessions, and decreased again in the final session. The mean was 66.00 percent for Phase 3. In Phase 4 the percent of letters retained began at 71 percent, decreased for two sessions, increased for two sessions, and decreased in the final session of the phase. The mean percent of letters retained during Phase 4 was 70.83 percent.

The mean percent of letters retained by Subject 4 in each phase of the study may be found in Table 8. An examination of Table 8 reveals that the change in mean percent of letters retained was not significant between any of the phases.

Behavioral Observations. On the fifth session of Phase 4 Subject 4 was observed to stop his tape recorder and rewind it before the command to stop was heard on a duplicate tape, started at the same time by the principal investigator. Since only one observation was made during each phase it is not possible to tell the number of sessions that may have been effected by decreased study time. It should be noted that the principal investigator miscounted and only provided Subject 4 with 14 treatment words during the fourth session of the fourth phase.

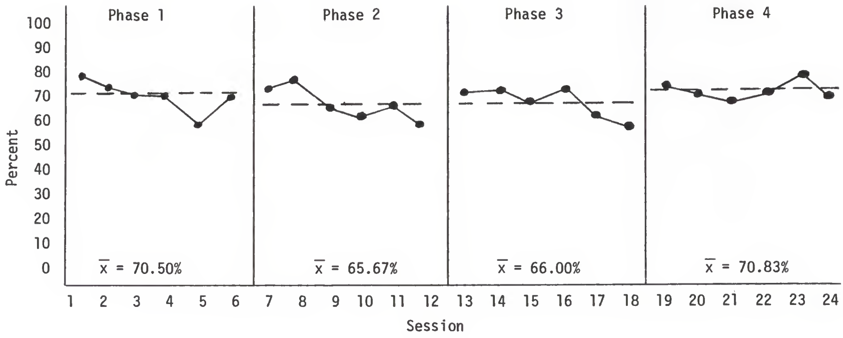

Figure 16

Percent of Letters Retained by Subject 4

CHAPTER V

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

The purpose of the present study was to investigate what effect, if any, self-monitoring would have on the acquisition and retention of spelling letters and words by LD students. This study was unique in that previous research has investigated the effects of self-monitoring on the fluency building rather than the acquisition stage of learning (see page 3 for a definition of these stages of learning). Further, the effect of self-monitoring on the retention of academic material has not been investigated.

This chapter presents a summary and discussion of the findings of the investigation. Also included are recommendations for future research.

Studying Behavior

Results of observation procedures designed to verify that the subjects were engaging in studying behavior indicated that study behaviors were exhibited from 30 to 92 percent of the observation intervals for the four subjects. Hallahan et al. (1979) have suggested that if a student's poor school performance is due to inattention to task, increased academic performance might be expected by increasing the child's attention. On the other hand, if the child lacks academic ability as well as the ability to attend, instruction as well as a method to increase attention to task may have to be provided.

The percent of intervals that the subjects in the present study were observed to exhibit study behavior seemed to divide the subjects into two groups: Subjects 1 and 2 whose mean percent of study behavior on the four sessions observed were 75 percent (SD = 7.8) and 87 percent (SD = 8.12) respectively and Subjects 3 and 4 whose mean percent of study behavior on the four sessions observed were 68.50 percent (SD = 25) and 55.50 percent (SD = 17.23) respectively. Thus, attention to task would appear to be more of a problem for Subjects 3 and 4. Since self-monitoring has been found to increase on-task behavior in previous studies (Broden et al., 1971; Hallahan et al., 1979) it would appear that if attention to task were the major problem for Subjects 3 and 4, a more dramatic treatment effect would be noted in these subjects. The results of the present study, however, indicated that there was meager support for a treatment effect in Subjects 1, 3, and 4. Thus, self-monitoring as it was implemented in the present study did not appear to differentially effect students with varying attention levels. Since studying behavior was only observed once during each phase of the study, however, this hypothesis is very tentative. As Hallahan et al. (1979) suggest further research into the differential effectiveness of self-monitoring based on the role attentional problems play in academic difficulties is indicated.

Accuracy of Self-Monitoring

A comparison of the subjects' self-monitoring cards with the behavioral observation checklist filled out by the principal investigator suggested that the students tended to overrate their studying behavior (see Table 3 for a comparison of subjects' study behavior self-reports and observation of study behavior). Differences in these ratings may have been due to the time of the observations, i.e., the principal investigator observed the subject's behavior a few seconds behavior the subject heard the cue to self-monitor. If this was the case, however, the overall percent of self-reported studying should still have more closely approximated the percent of studying observed by the principal investigator. A lack of correspondence between a subject's own assessment and that of an external observer has been noted in previous self-monitoring studies conducted by Broden et al. (1971) and Hallahan et al. (1979). Both of these investigators found that self-monitoring was effective in modifying the behaviors under study despite questionable accuracy of self-monitoring. Therefore, these authors suggested that a high level of accuracy in self-monitoring may not be necessary for behavioral change. In the present study the accuracy of self-monitoring was questionable and the data suggest that self-monitoring as used in this study resulted in an increase in the percent of words and letters acquired and retained by one of the subjects at least on a short-term basis. Thus the contention that a high level of accuracy in self-monitoring may not be necessary for behavior change received some support in this investigation.

Discussion of Research Questions

The data obtained on each subject will be presented in relation to the questions under investigation. A comparison of the results of all four subjects will also be provided. Data will be discussed in relation to whether it supports or does not support the question addressed. If support for a research question is not provided by the obtained data, possible explanations will be discussed.

The data obtained on Subject 3 has been excluded from the following discussion of results. It is felt that control of the variables affecting this subject's spelling behavior was never achieved. Recall of academic material was reported by the regular class teacher to be a serious problem for Subject 3. In light of the fact that the task in this experiment was strictly a recall task, it is possible that Subject 3 was not an appropriate candidate for the study. Perhaps inclusion of a measure of recall in the subject selection criteria might have alleviated this problem.

Question 1: What is the Effect of Self-Monitoring of Studying Behavior on the Percent of Spelling Words Acquired by LD Students?

The data concerning the effect of self-monitoring as used in this study on the percent of spelling words acquired by the three subjects appear to be equivocal. Subject 2 acquired 25.33 percent more words in the first self-monitoring phase than in the baseline condition. The percent of words acquired decreased subsequently by 21.17 percent in the return to baseline condition and increased by 18 percent in the final self-monitoring phase. The introduction of self-monitoring resulted in a 12.33 percent increase over baseline in the percent of words acquired by Subject 4. Further, a 9 percent decrease in the percent of words acquired was observed in the return to baseline condition. No treatment effect was apparent in the final self-monitoring phase, however. No effect was demonstrated on the percent of words acquired by Subject 1.

Question 2: What is the Effect of Self-Monitoring of Studying Behavior on the Percent of Spelling Words Retained by LD Students?

The data concerning the effect of self-monitoring as used in this study on the percent of spelling words retained by the three subjects appear to be equivocal. The percent of words retained by Subject 1 increased 12.17 percent with the introduction of self-monitoring and decreased 10 percent in the return to baseline condition. The introduction of self-monitoring resulted in 17.11 percent increase over baseline in the percent of words retained by Subject 2. A 10 percent decrease in the percent of words retained by Subject 4 was demonstrated in the return to baseline condition. A treatment effect in the final self-monitoring phase was not demonstrated by any of the subjects.

Question 3: What is the Effect of Self-Monitoring of Studying Behavior on the Percent of Spelling Letters Acquired by LD Students?

The data seem to support a conclusion that self-monitoring as used in this study did not have an effect on the percent of spelling letters acquired by the three subjects. The introduction of self-monitoring resulted in a 14.83 percent increase over baseline in the percent of letters acquired by Subject 2; however, this effect was not reestablished in subsequent phases. No effect was demonstrated on the percent of spelling letters acquired by Subjects 1 and 4.

Question 4: What is the Effect of Self-Monitoring of Studying Behavior on the Percent of Spelling Letters Retained by LD Students?

The data seem to support a conclusion that self-monitoring as used in this study did not have an effect on the percent of spelling letters retained by the three subjects. The introduction of self-monitoring resulted in a 13.50 percent increase over baseline in the percent of letters retained by Subject 2; however, this effect was not reestablished in subsequent phases. No effect was demonstrated on the percent of spelling letters retained by Subjects 1 and 4.

Cautions and Limitations

Criterion for significant change on the spelling dependent measures was pre-experimentally set at 10 percent by the principal investigator. Since rules for determining significance criteria have not been established, each reader must decide for him/herself the amount of change that represents a meaningful change.

A possible limitation of the present study was that observation of studying behaviors was conducted only once during each phase of the study. An estimate of the percent of time subjects exhibited study behaviors during each experimental session could provide valuable information related to the effectiveness of self-monitoring.

A factor that should be considered in future investigations is the subjects' dislike of the experimental task. During the second phase of the study the subjects were already making such comments as "Do I have to listen to that tape again?" Possibly, the subjects' dislike of the headphones may have been due to the fact that during the independent study tape the students wore headphones to listen to a start command followed by 10 minutes of silence. General dislike of the experimental tasks may have been due to the excessive amount of testing required, i.e., before and after each experimental session, or the fact that experimental sessions were conducted twice each day. It is possible that some form of reinforcement might maintain interest in the task. Interest in the experimental task may also be improved by providing the students with feedback on their spelling performance. The subjects often asked the principal investigator whether or not they had spelled a word correctly on the spelling posttest.

The finding that self-monitoring as used in this study had differential effects on the subjects warrants consideration. It is interesting to note that the subject who demonstrated the most pronounced treatment effect (Subject 2) and the subject who performed the most poorly on the experimental task (Subject 3) both had a reported IQ of 76. The principal investigator noted that Subject 1 was alert and quick-witted. In contrast, Subject 3 appeared to be slow and more like a mentally retarded (MR) student than LD student. Possibly intelligence was a factor that affected the results of the present study. Further, the perceptual difficulties associated with mental retardation and learning disabilities may have made a symbolic task such as spelling inappropriate for these subjects.

Another factor which may have resulted in differential treatment effects was the amount of study behavior exhibited. The most dramatic treatment effect was demonstrated by Subject 2 who exhibited the most study behaviors. Subject 1 also exhibited a high percent of studying behaviors, but did not demonstrate a treatment effect. A possible explanation for the differential effects may be that a lack of academic ability, or lack of ability to perform the specific task in this experiment, may override the effects of increased attending behavior resulting from self-monitoring as suggested by Hallahan et al. (1979).

A possible explanation for the finding that self-monitoring as used in this study did not produce dramatic treatment effects in three of the four subjects may be that the subjects did not really engage in self-monitoring. For example, the principal investigator noted that Subject 1 did not make checks on his self-monitoring card at the appropriate time during two sessions in the second self-monitoring phase. In retrospect it would be beneficial to observe self-monitoring during every experimental session.

Recommendations for Future Research

The present study was designed to answer the question of whether tape recorder-cued self-monitoring was more effective than the absence of self-monitoring in increasing acquisition and retention of spelling letters and words.

1. Further research to develop other methods of cueing self-monitoring of covert behaviors with children would appear to add to the literature concerning self-control. For example, since a method which relied on an auditory self-monitoring cue was used in this study, visually cued self-monitoring techniques might be investigated. A comparison of the various techniques to cue self-monitoring would then appear warranted.

2. In future studies the possible novelty effects of the experimental conditions should be considered. Wells (1980) has recommended that phases to control for the novelty effect should be put in before and after treatment conditions. Further, Wells cautions that the phases should be of sufficient length to exhaust the potential novelty effect.

3. Future investigations might address the question of whether self-monitoring is more effective with students who exhibit certain characteristics, or with certain academic tasks.

4. A method to insure that the subjects engage in self-monitoring should be considered in future studies.

5. Future self-monitoring studies should consider changing the criterion for a phase change from a specified number of sessions in each phase to a stability criterion.

6. The use of a group research design should be considered in future investigations concerning the effect of self-monitoring on the acquisition of academic material.

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APPENDIX A

ALACHUA COUNTY CRITERIA FOR ELIGIBILITY: SPECIFIC LEARNING DISABILITIES

Specific learning disabilities - one who exhibits a disorder in one (1) or more of the basic psychological processes involved in understanding or in using spoken and written language. These may be manifested in disorders of listening, thinking, reading, talking, writing, spelling, or arithmetic. They do not include learning problems which are due primarily to visual, hearing, or motor handicaps, to mental retardation, emotional disturbance, or to an environmental deprivation.

1. Criteria for Eligibility
   a. Evidence of a disorder in one (1) or more of the basic psychological processes.
      (1) Based on a student's expected level of functioning, a score of two (2) standard deviations or less below the mean in one (1) process area or a score of one and one-half (1.5) standard deviations or less below the mean in three (3) or more process areas. Process areas are defined as: visual channel processes, auditory channel processes, haptic channel processes, language processes, and sensory integrated processes. In cases where the

standard deviation is not available, a score of 70% or less of the student's expectancy age in one (1) process area or 80% or less in three (3) or more process areas may be used.

(2) Evidence of a process strength at or above the student's expected level of functioning.

(3) If more than one process test or subtest is given in any process cluster area, the mean level of functioning will be used to establish a deficit. Process clusters are: visual memory, auditory memory, visual association, auditory association, visual motor, auditory motor, visual perception, auditory perception.

(4) Only subtests appropriate for the student's expectancy age should be used for placement purposes.

(5) A student does not qualify for eligibility if the following subtests are the only ones that indicate a process strength or deficit.

    (a) Detroit Test of Learning Abilities
        Free Association
        Social Adjustment A
        Social Adjustment B
        Number Ability

    (b) Illinois Test of Psycholinguistic Abilities
        Manual Expression
        Grammatic Closure
        Sound Blending

In order for these subtests to be considered, they must be viewed in conjunction with other subtests.

b. Evidence of academic deficits.

(1) Based on the student's expected level of functioning, a score of: 85% expectancy age or below for third (3) through sixth (6) grade; 75% expectancy age or below for seventh (7) through ninth (9) grade; or, 65% expectancy age below tenth (10) through twelfth (12) grade is required in one (1) or more of the following academic areas: reading, writing, arithmetic, or spelling. For students in kindergarten (kg) through second (2) grade, evidence must be presented that achievement is 85% expectancy age or below on pre-academic tasks which require listening, thinking, or speaking skills. A student may not be placed for a deficit in either writing or spelling or both.

(2) If more than one academic instrument is used to document a weakness, the results must consistently show deficits in the same academic area. If more than one level of functioning is obtained, the mean level of functioning will be used to establish weakness.

c. Evidence that learning problems are not due primarily to other handicapping conditions.

(1) A score at or above one standard deviation below the mean on an individual test of intellectual functioning or evidence that a score below one standard deviation is not a reliable indicator of the student's intellectual potential.

If the full scale on a Wechsler test is not within one standard deviation from the mean, the student must have one score (verbal or performance) that is within one standard deviation of the mean. If a valid Wechsler score is not available for any individual case, the Directors of Exceptional Student Education and Student Services must agree on comparable criteria that indicate the student's intellectual potential.

(2) For students with visual processing deficits, visual acuity above 20/70 in the better eye with best possible correction, or evidence that the student's inability to perform adequately on tasks which require visual processing is not due to poor visual acuity.

(3) For students with auditory processing or language deficits, auditory acuity loss of less than 30 decibels in the better ear unaided, or evidence that the student's inability to perform adequately on tasks which require auditory processing of language is not due to poor auditory acuity.

(4) For students with a motor handicap, evidence that their inability to perform adequately on tasks which assess the basic psychological process is not due to the motor handicap.

(5) For students who exhibit persistent and consistent severe emotional handicap, evidence that their inability to perform adequately on tasks which assess the basic psychological processes is not due to emotional handicap.

APPENDIX B

DEMOGRAPHIC DATA ON SUBJECTS

Subject	Sex	Age	Grade	IQ	Race	Spelling Grades	Reading Grade Level
1	M	9	4	105	W	N,N,N,N,S,S	3.4
2	M	11	5	76	W	C,C-,C-,U,U,D	2.9
3	M	11	7	76	W	B-,B,B,B,B,B	2.7
4	M	9	4	108	W	S-,S-,S-,S-,S-,S	3.5

APPENDIX C

INSTRUCTIONS FOR SPELLING PRETEST

(Student's name) , now I want to find out which spelling words you need to work on. I will say each word once, use it in a sentence, then say the word again. After that, you write the word. OK, any questions? (If yes, re-explain. If no, then go ahead and start.)

APPENDIX D

INSTRUCTIONS FOR DETERMINATION OF STUDY METHOD

(Student's name), I am going to give you a deck of spelling words that I want you to study. There are a lot of ways to study spelling words. You can look at the word, spell it either out loud or to yourself a few times, then look away and spell the word. You can look at the word, spell it either out loud or to yourself a few times, turn the word over and spell it, then look to see if you spelled the word correctly. Or, you can look at the word, spell it out loud or to yourself a few times, turn the card over and write the word on a sheet of paper, then look to see if you spelled the word correctly. How do you want to study your spelling words?

APPENDIX E

SELF-MONITORING CARD

Name: Date:

Session:

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APPENDIX F

INSTRUCTIONS FOR INDEPENDENT STUDY PHASE

OK, (student's name), you have 10 minutes to study these spelling words. This tape will let you know when to start and when to stop studying. When you hear "Stop" turn off the tape recorder and bring your deck of spelling words over to me. OK? What do you do when you hear start on the tape? What do you do when you hear stop? (Principal investigator gives feedback "Good" or repeats instructions after each question.) OK, try to learn as many words as you can during the 10 minutes the tape is on.

APPENDIX G

INSTRUCTIONS FOR INDEPENDENT STUDY PLUS SELF-MONITORING PHASE

(Student's name) , now I want you to keep track of when you are and when you aren't studying your spelling words. The tape you will hear now has beeps on it. Each time you hear a beep ask yourself "Was I studying my spelling words when I heard the beep?" Give yourself a check on this card (principal investigator places self-monitoring card in front of student) like this (makes check on card) if you were studying and an X (makes X on card) if you were not studying. Go to the next box when you hear another beep. Write your name, the date, and either a one or two where it says session (point). Write one if it's the first time you studied spelling words that day and a two if it's the second time. OK, what do you do when you hear start? What do you do when you hear a beep? What do you do when you hear stop? (Principal investigator gives feedback "Good" or repeats instructions after each question.) Let's practice a few times to make sure everything is working OK (give feedback, provide instruction if necessary). This is a different set of words than you had before. Try to learn as many words as you can during the 10 minutes the tape is on.

APPENDIX H

BEHAVIOR OBSERVATION CHECKLIST

	Auditory Signal											
Behavior	1	2	3	4	5	6	7	8	9	10	11	12
looking at treatment card												
saying the letters or words to self												
looking away to spell word												
picking up or putting down card												
turning treatment card over to self-test												
writing word on sheet of paper												
looking at word written on paper												
moving card to back of stack												
stopping tape recorder												
yawning												
watching other students or teachers												
looking at shoe, hand, tape												

Appendix H - Continued

Auditory Signal

Behavior	1	2	3	4	5	6	7	8	9	10	11	12
shaking head side to side												
flipping through cards												
staring into space with blank look on face												
other												

APPENDIX I

INDIVIDUAL DATA

Subject 1

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 1					
1	15	6	40%	8	53%	109	70	64%	80	73%
2	15	5	33%	5	33%	106	63	59%	61	58%
3	15	3	20%	3	20%	98	56	57%	52	53%
4	15	3	20%	4	27%	106	63	59%	69	65%
5	15	6	40%	7	47%	101	70	69%	67	66%
6	15	6	40%	5	33%	102	72	71%	66	65%
Total	90	29		32		622	394		395	
Mean			32.17%		35.50%			63.17%		63.33%
SD			9.81		12.36			5.81		6.95

Subject 1 - Continued

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 2					
7	15	8	53%	10	67%	86	57	66%	66	77%
8	15	6	40%	8	53%	88	64	73%	64	73%
9	15	9	60%	8	53%	91	68	75%	64	70%
10	15	4	27%	5	33%	96	56	58%	62	65%
11	15	4	27%	7	47%	94	53	56%	64	68%
12	15	4	27%	5	33%	90	53	59%	60	67%
Total	90	35		43		545	351		380	
Mean			39.00%		47.67%			64.50%		70.00%
SD			14.63		13.13%			8.12		4.38

Subject 1 - Continued

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 3					
13	15	6	40%	6	40%	95	62	65%	66	67%
14	15	8	53%	4	27%	92	68	74%	50	54%
15	15	5	33%	5	33%	93	55	59%	60	56%
16	15	6	40%	6	40%	93	56	60%	54	58%
17	15	8	53%	8	53%	98	68	69%	69	70%
18	15	3	20%	5	33%	98	53	54%	54	55%
Total	90	36		34		569	362		353	
Mean			39.83%		37.67%			65.40%		61.50%
SD			12.54		8.98			6.27		6.72

Subject 1 - Continued

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 4					
19	15	8	53%	9	60%	93	71	76%	73	78%
20	15	5	33%	5	33%	83	50	60%	51	61%
21	15	5	53%	4	27%	88	59	67%	60	68%
22	15	11	73%	9	60%	97	84	87%	81	84%
23	15	6	40%	6	40%	96	65	68%	66	69%
24	15	4	27%	4	27%	96	61	64%	58	60%
Total	90	39		37		553	390		389	
Mean			43.17%		41.17%			70.33%		70.00%
SD			17.12		15.35			9.73		9.44

Subject 2

Session	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
					Phase 1					
1	15	7	47%	6	40%	106	85	80%	79	75%
2	15	2	13%	2	13%	100	68	68%	61	61%
3	15	2	13%	3	20%	108	64	59%	61	56%
4	15	1	7%	2	13%	104	52	50%	56	54%
5	15	3	20%	4	27%	102	58	57%	60	59%
6	15	5	33%	4	27%	104	63	61%	58	56%
Total	90	20		21		624	390		375	
Mean			22.17%		23.33%			62.50%		60.17%
SD			15.08		10.29			10.34		7.68

Subject 2 - Continued

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 2					
7	15	8	53%	7	47%	90	75	83%	68	76%
8	15	7	47%	6	40%	92	80	87%	72	78%
9	15	8	53%	6	40%	92	75	82%	71	77%
10	15	6	40%	6	40%	97	71	73%	71	73%
11	15	8	53%	6	40%	100	78	78%	70	70%
12	15	5	33%	5	33%	93	68	73%	63	68%
Total	90	42		36		564	447		415	
Mean			46.50%		40.00%			79.33%		73.67%
SD			8.38		4.43			4.41		4.03

Subject 2 - Continued

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 3					
13	15	5	33%	4	27%	98	70	71%	69	70%
14	15	3	20%	6	40%	99	68	69%	74	75%
15	15	3	20%	2	13%	102	73	72%	73	72%
16	15	5	33%	7	47%	108	87	81%	87	81%
17	15	2	13%	5	33%	106	78	74%	77	73%
18	15	5	33%	6	40%	105	77	73%	82	78%
Total	90	23		30		618	453		462	
Mean			25.33%		33.33%			73.33%		74.83%
SD			8.78		12.08			4.13		4.07

Subject 2 - Continued

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 4					
19	15	11	73%	8	53%	99	87	88%	82	83%
20	15	7	47%	6	40%	101	83	82%	78	77%
21	15	6	40%	6	40%	91	69	76%	70	77%
22	15	7	47%	6	40%	93	72	77%	70	75%
23	15	6	40%	7	47%	93	67	72%	73	78%
24	15	2	13%	2	13%	92	59	64%	62	67%
Total	90	39		35		569	437		435	
Mean			43.33%		38.83%			76.50%		76.17%
SD			19.23		13.70			8.24		5.23

Subject 3

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 1					
1	15	6	40%	4	27%	97	63	65%	56	58%
2	15	1	7%	2	13%	108	60	56%	58	54%
3	15	1	7%	1	7%	108	69	64%	64	59%
4	15	0	0%	1	7%	107	67	64%	60	56%
5	15	1	7%	2	13%	106	62	58%	61	58%
6	15	1	7%	2	13%	106	63	59%	63	59%
Total	90	10		12		632	384		362	
Mean			11.33%		13.33%			60.83%		57.33%
SD			14.32		7.31			3.66		1.97

Subject 3 - Continued

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 2					
7	15	1	7%	3	20%	88	42	48%	48	55%
8	15	4	27%	1	7%	88	46	52%	44	50%
9	15	1	7%	1	7%	94	46	49%	39	41%
10	15	2	13%	1	7%	90	46	51%	46	51%
11	15	1	7%	1	7%	89	44	49%	51	57%
12	15	0	0%	1	7%	88	50	57%	50	57%
Total	90	9		8		537	274		278	
Mean			10.17%		9.67%			51.00%		51.83%
SD			9.22		7.19			3.29		6.08

Subject 3 - Continued

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Period 1					
13	15	2	13%	3	20%	90	51	57%	52	58%
14	15	1	7%	1	7%	89	49	55%	44	49%
15	15	2	13%	2	13%	88	50	57%	50	57%
16	15	1	7%	0	8%	86	40	47%	46	53%
17	15	1	7%	1	7%	85	42	49%	37	44%
18	15	1	7%	0	0%	87	37	43%	33	38%
Total	90	8		7		525	269		262	
Mean			9.00%		7.83%			51.33%		49.83%
SD			3.10		7.73			5.85		7.78

Subject 3 - Continued

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Period 2					
19	15	3	20%	3	20%	91	57	63%	48	53%
20	15	3	20%	3	20%	90	54	60%	56	62%
21	15	1	7%	1	7%	94	50	53%	51	54%
22	15	1	7%	1	7%	93	50	54%	49	53%
23	15	2	13%	1	7%	92	46	50%	48	52%
24	15	1	7%	1	7%	89	47	53%	52	58%
Total	90	11		9		549	304		304	
Mean			12.33%		11.33%			55.50%		55.33%
SD			6.38		6.71			4.93		3.88

Subject 4

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 1					
1	15	7	47%	8	53%	108	80	74%	84	78%
2	15	7	47%	5	33%	114	89	78%	85	75%
3	15	2	13%	3	20%	105	72	69%	75	71%
4	15	3	20%	3	20%	110	82	75%	78	71%
5	15	2	13%	2	13%	113	70	62%	65	58%
6	15	2	13%	4	27%	108	68	63%	76	70%
Total	90	23		25		658	461		463	
Mean			25.50%		27.67%			70.17%		70.50%
SD			16.87		14.17			6.62		6.83

Subject 4 - Continued

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 2					
7	15	7	47%	7	47%	89	66	74%	66	74%
8	15	7	47%	8	53%	92	68	74%	70	76%
9	15	5	33%	3	20%	96	60	63%	60	63%
10	15	4	27%	5	33%	95	55	58%	58	61%
11	15	5	33%	5	33%	93	64	69%	60	65%
12	15	6	40%	4	27%	96	65	68%	53	55%
Total	90	34		32		561	378		367	
Mean			37.83%		35.50%			67.67%		65.67%
SD			8.21		12.36			6.28		7.99

Subject 4 - Continued

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 3					
13	15	7	47%	6	40%	87	62	71%	62	71%
14	15	6	40%	6	40%	85	60	71%	61	72%
15	15	3	20%	2	13%	93	60	65%	61	66%
16	15	2	13%	5	33%	96	61	64%	67	70%
17	15	3	20%	3	20%	97	64	66%	57	59%
18	15	5	33%	1	7%	92	59	64%	53	58%
Total	90	26		23		550	366		361	
Mean			28.83%		25.50%			66.83%		66.00%
SD			13.26		14.18			3.31		6.16

Subject 4 - Continued

	Total Words Possible	Words Acquired	Percentage of Words Acquired	Words Retained	Percentage of Words Retained	Total Letters Possible	Letters Acquired	Percentage of Letters Acquired	Letters Retained	Percentage of Letters Retained
Session					Phase 4					
19	15	6	40%	5	33%	99	71	72%	70	71%
20	15	6	40%	5	33%	97	73	75%	67	69%
21	15	3	20%	3	20%	101	67	66%	65	64%
22	15	2	13%	3	20%	102	59	58%	68	67%
23	15	5	33%	7	47%	106	79	75%	85	85%
24	15	6	40%	2	13%	104	82	79%	72	69%
Total	90	28		25		609	431		427	
Mean			31.00%		27.67%			70.83%		70.83%
SD			11.76		12.36			7.63		7.33

BIOGRAPHICAL SKETCH

Laura Ann Stoller was born December 13, 1952, in Miami, Florida. She attended elementary through high school in Miami, graduating from North Miami Senior High in 1970. She was awarded an Associate of Arts in education degree from Miami Dade Community College in 1972, a Bachelor of Science in speech pathology in 1974, and a Master of Science degree in speech pathology in 1975, both from Florida State University. She attended the University of Florida during the summers of 1976 and 1977 as a doctoral student in speech with a minor in learning disabilities. In June of 1978, she began to attend the University of Florida full-time as a doctoral student in special education, learning disabilities with a minor in speech pathology.

Laura's work experience includes: speech pathology undergraduate intern at Crawfordville Elementary School, Waculla County, Florida, September-December 1973; graduate training as a speech pathologist at Florida State University Regional Rehabilitation Center, Tallahassee, Florida, June 1974-March 1975; graduate intern at Northside Elementary School, Broward County, Florida, April-June 1975; speech pathologist for Duke University Speech and Hearing Summer Camp, Durham, North Carolina, June-July 1975; speech pathologist for Dade County Public Schools, Miami, Florida, August 1975-January 1978.

During her doctoral program Laura has been involved in a variety of activities including educational assessment of learning disabled students, university teaching, and supervision of practicum students in learning disabilities and emotional disturbance. She has also presented at state and national conventions and published in the professional literature.

From January, 1978, to August, 1980, Laura completed program requirements for the Ph.D. degree in special education at the University of Florida. The areas of emphasis in her study included (1) learning disabilities, (2) emotional handicaps, (3) speech and language disorders, (4) elementary level programs, and (5) educational research. Upon completion of the doctoral program she will take a faculty position in a university.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Rex E. Schmid, Chairman
Associate Professor of Special
Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Robert F. Algozzine

Robert F. Algozzine
Associate Professor of Special
Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adeqaute, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Robert E. Jester
Associate Professor of Foundations
of Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Leonard L. LaPointe
Assistant Professor of Speech

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Stuart E. Schwartz

Stuart E. Schwartz
Associate Professor of Special Education

This dissertation was submitted to the Graduate Faculty of the Department of Special Education in the College of Education and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

August, 1980

Dean, Graduate School